

**HTRW**  
**Remedial Action**  
**Work Breakdown Structure**

**HTRW**

**RA WBS**

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Developed By The  
Hazardous, Toxic, Radioactive Waste  
Interagency Cost Engineering Group

Army Corps of Engineers  
Navy  
Air Force  
Environmental Protection Agency  
Department of Energy

# **DATA DICTIONARY**

## **STANDARD DESCRIPTIONS**

### **HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE**

This document contains standard descriptions for the Hazardous, Toxic, and Radioactive Waste (HTRW) Remedial Action (RA) Work Breakdown Structure (WBS). A standard description is included for the second (System) and third (Subsystem) levels of the HTRW RA WBS. This "Remedial Action" WBS is intended to be used for all types of remedial action (construction) contracts for "Remedial Action", "Emergency Response", "Rapid Response", "Immediate Response", "Interim Remediation", "Preplaced Remedial Action", "Removal Action", "Total Environmental Restoration Contracts (TERC)", "Disposal", "Environmental", and others.

The HTRW RA WBS consists of four hierarchical levels. This document describes Level 2 (System) and Level 3 (Subsystem) under Level 1 (Account 331XX "HTRW Remedial Action (Construction)". Further Level 1 breakdown (not included in this document) consists of 332XX "Engineering During Construction" and "333XX "Supervision & Administration (S&A) (Construction Management)". There are twenty-one (21) Level 2 Systems (331XX 01 through 331XX 22) described, with number 33XXX 16 reserved for future use. Note that because certain activities occur more than once in the WBS, both Levels 2 and 3 must be read and considered in order to select the correct item. Example: Transportation of HTRW to a treatment plant (a Level 3 Subsystem) occurs several times in the RA WBS. In order to make the correct item selection for transportation, Level 2 Systems (where transportation is a Subsystem) must be read and considered.

This document includes the unit of measure (UOM) in both English and Metric and a standard description for each RA WBS item in Level 3 (Subsystem). Units of measure assigned to Level 3 characterize Subsystem costs. Standard definitions for Level 4 (Assembly Category) are not included in this document. Units of measure for the treatment categories (331XX 11 through 331XX 15) generally indicate the total quantity of material treated in CY

(M3), MGA (KLI), etc.

The HTRW RA WBS considers all possible construction items by including the "Other" item at all levels. All items not directly described by the WBS titles are included in the "Other" items as selected by the user (Cost Engineer) for the project estimate. The "Other" items are designated by the number "9X." The user is to replace the "X" with a number, 0 through 9, and assign an appropriate item description and unit of measure. Minimize the use of the "Other" 9X items. Operation which is of short term and is integral with remedial action or construction activities is to be included in Account 331XX at the appropriate items. For example, to incinerate soil, construction activities include excavation and hauling of contaminated soil to the incinerator, operation of the incinerator, and loading and hauling of the treated material after incineration to a landfill or disposal facility. Another example is a one year operation period which typically is included with the construction contract of projects involving treatment technologies. In such cases, the operation is integral with remedial action construction activities, and thus is included in Remedial Action (Construction) Account 331XX. Operation activities which are long-term, and are not integral with remedial action are accounted for in a separate document as Account 34XXX.

Please note the following for Data Dictionary:

NOTE 1: For the five character Account Number (Level 1), the first three characters are from the Army Corps of Engineers Superfund accounting system. The last 2 characters are user defined for estimating flexibility.

NOTE 2: Account 32XXX (HTRW Pre Construction and Project Management Activities) includes Project Management, Investigations, and Remedial Design. Account 32XXX is not included in this document.

NOTE 3: Account 33XXX (HTRW Construction Activities) includes Remedial Action (including operation during construction), Engineering During Construction (EDC), and Supervision and Administration (S&A) (Construction Management).

NOTE 4: Account 34XXX (HTRW Post Construction and Financial Closeout Activities) includes Post Construction Operation and Maintenance (O&M) and Fiscal/Financial Closeout. Account 34XXX is not included in this document.

NOTE 5: The Superfund and Work for Others Programs use Account Numbers 32XXX,

33XXX, and 34XXX. The DERP (Defense Environmental Restoration Program) and BRAC ER (Base Realignment and Closure Environmental Restoration) Programs use corresponding Account Numbers 72XXX, 73XXX, and 74XXX, which are not included in this document.

NOTE 6: Unit of Measure (UOM) Definitions:

English	Metric
EA - Each	EA - Each
SY - Square Yards	M2 - Square Meters
ACR - Acres	HEC - Hectars
CY - Cubic Yards	M3 - Cubic Meters
LF - Linear Feet	M - Meters
MGA - Thousand Gallons	KLI - Kilo Liters
TON - Tons	MT - Metric Tons
MO - Months	MO - Months
HR - Hours	HR - Hours
GAL - Gallons	LIT - Liters
CF - Cubic Feet	M3 - Cubic Meters
LB - Pounds	KG - Kilo Grams
SF - Square Feet	M2 - Square Meters

**TABLE OF CONTENTS**  
**HTRW REMEDIAL ACTION**  
**WORK BREAKDOWN STRUCTURE (WBS)**

WBS Number	Standard Description	Page
<b>33XXX</b>	<b>HTRW CONSTRUCTION ACTIVITIES</b>	
<b>331XX</b>	<b>HTRW REMEDIAL ACTION (CONSTRUCTION)</b>	
01	MOBILIZATION AND PREPARATORY WORK	14
02	MONITORING, SAMPLING, TESTING, AND ANALYSIS	16
03	SITE WORK	19
04	ORDNANCE & EXPLOSIVE - CHEMICAL WARFARE MATERIAL (OE-CWM) REMOVAL AND DESTRUCTION	22
05	SURFACE WATER COLLECTION AND CONTROL	23
06	GROUNDWATER COLLECTION AND CONTROL	26
07	AIR POLLUTION/GAS COLLECTION AND CONTROL	29
08	SOLIDS COLLECTION AND CONTAINMENT	31
09	LIQUIDS/SEDIMENTS/SLUDGES COLLECTION AND CONTAINMENT	33
10	DRUMS/TANKS/STRUCTURES/MISCELLANEOUS DEMOLITION AND REMOVAL	35
11	BIOLOGICAL TREATMENT	37
12	CHEMICAL TREATMENT	42
13	PHYSICAL TREATMENT	48
14	THERMAL TREATMENT	57
15	STABILIZATION/FIXATION/ENCAPSULATION	60
16	(RESERVED FOR FUTURE USE)	
17	DECONTAMINATION AND DECOMMISSIONING (D&D)	63
18	DISPOSAL (OTHER THAN COMMERCIAL)	65
19	DISPOSAL (COMMERCIAL)	68
20	SITE RESTORATION	69
21	DEMOBILIZATION	71
22	GENERAL REQUIREMENTS (OPTIONAL BREAKOUT)	73
9X	OTHER (Use Numbers 90-99)	
<b>332XX</b>	<b>ENGINEERING DURING CONSTRUCTION (EDC)</b>	
<b>333XX</b>	<b>SUPERVISION &amp; ADMINISTRATION (S&amp;A)</b>	
	<b>(CONSTRUCTION MANAGEMENT)</b>	

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX					<b>HTRW REMEDIAL ACTION</b> Account 33XXXX includes HTRW remedial action (construction) work for all programs and includes operation which occurs during construction (remedial action). Account 33XXXX excludes project management at all phases and excludes pre construction investigations and remedial design which are all in Account 32XXX. Account 33XXX excludes post construction Operation and Maintenance (O&M) which is in Account 34XXX.
331XX	01				<b>MOBILIZATION AND PREPARATORY WORK</b> Includes all preparatory work required during remedial action or construction. This includes submittals; construction plans; mobilization of personnel, facilities and equipment; construction of temporary facilities; temporary utilities; temporary relocations and setup of decontamination facilities and construction plant.
331XX	02				<b>MONITORING, SAMPLING, TESTING, AND ANALYSIS</b> Provides for all work during remedial action associated with air, water, sludge, solids and soil sampling, monitoring, testing, and analysis. Includes sample taking, shipping samples and sample analysis by on-site and off-site laboratory facilities.
331XX	03				<b>SITEWORK</b> Sitetwork during remedial action consists of site preparation, site improvements, and site utilities. Site preparation includes demolition, clearing, and earthwork. Site improvements include roads, parking, curbs, gutters, walks and other hardscaping. Site utilities include water, sewer, gas, other utility distribution. Also includes new fuel storage tanks. All work involving contaminated or hazardous material is excluded from this system. Storm drainage involving contaminated surface water is included under "Surface Water Collection and Control" (331XX.05). Note that topsoil, seeding, landscaping and reestablishment of existing structures altered during remediation activities are included in "Site Restoration" (331XX.20).
331XX	04				<b>ORDNANCE AND EXPLOSIVE-CHEMICAL WARFARE MATERIAL (OE-CWM) REMOVAL AND DESTRUCTION</b> Includes the locating, removing, and destruction of all ordnance, conventional or chemical, fused or unfused, related scrap, propellants, and delivery vehicles during remedial action. Providing for public involvement, providing subsurface

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ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					data for the delineating the extent of the contamination. Also includes the construction of temporary explosive storage bunkers and surveys.
331XX	05				<p><b>SURFACE WATER COLLECTION</b>  Provides for the collection and control of contaminated surface water through the construction of storm drainage piping and structures, erosion control measures, and civil engineering structures such as berms, dikes and levees. Includes the collection of surface water through the construction of lagoons, basins, tanks, dikes, and pump systems. Includes transport to treatment plant.</p>
331XX	06				<p><b>GROUNDWATER COLLECTION AND CONTROL</b>  Provides for the remedial action collection and control of contaminated groundwater through the construction of piping, wells, trenches, slurry walls, sheet piling and other physical barriers. Includes the collection of groundwater through the construction of lagoons, basins, tanks, dikes, and pump systems. Includes transport to treatment plant.</p>
331XX	07				<p><b>AIR POLLUTION/GAS COLLECTION AND CONTROL</b>  Includes theremedial action construction for the collection and control of gas, vapor and dust.</p>
331XX	08				<p><b>SOLIDS COLLECTION AND CONTAINMENT</b>  Provides for exhuming and handling of solid hazardous, toxic and radioactive waste (HTRW) during remedial action through excavation, sorting, stockpiling, and filling containers. Provides for containment of solid waste through the construction of multilayered caps as well as dynamic compaction of burial grounds, cribs, or other waste disposal units. Includes transport to treatment plant.</p>
331XX	09				<p><b>LIQUIDS/SEDIMENTS/SLUDGES COLLECTION AND CONTAINMENT</b>  Includes collection during remedial action of HTRW-contaminated liquids and sludges through dredging and vacuuming, and the furnishing and filling of portable containers. Includes the containment of liquids and sludges through the construction of lagoons, basins, tanks, dikes, and drain system. Includes transport to treatment plant.</p>
331XX	10				<p><b>DRUMS/TANKS/STRUCTURES/MISCELLANEOUS DEMOLITION AND REMOVAL</b>  Includes the demolition and removal during remedial action of HTRW contaminated drums, tanks, contaminated paint removal, and other structures by excavation and downsizing. Does not include filling portable hazardous waste containers or transport of wastes to treatment or disposal facilities. See "Solids Collection and Containment" (331XX.08), 'Disposal (Other than</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	11				<p><b>BIOLOGICAL TREATMENT</b>            Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.11.(01.-14.).            Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.11.50.). Biological treatment is the microbial transformation of organic compounds. Biological treatment processes can alter inorganic compounds such as ammonia and nitrate, and can change the oxidation state of certain metal compounds. Includes in-situ biological treatment such as land farming as well as activated sludge, composting, trickling filters, anaerobic, and aerobic digestion. Includes process equipment and chemicals required for treatment. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).</p>
331XX	12				<p><b>CHEMICAL TREATMENT</b>            Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.12.(01.-14.).            Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.12.50.). Chemical treatment is the process in which hazardous wastes are chemically changed to remove toxic contaminants from the environment. Type of treatment included in this system are oxidation/reduction, solvent extraction, chlorination, ozonation, ion exchange, neutralization, hydrolysis, photolysis, dechlorination, and electrolysis reactions. Includes process equipment and chemicals required for treatment. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).</p>
331XX	13				<p><b>PHYSICAL TREATMENT</b>            Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.13.(01.-32.).            Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.13.50.). These treatment processes are the physical separation of contaminants from solid, liquid or gaseous waste streams. The treatments</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					are applicable to a broad range of contaminant concentrations. Physical treatments generally do not result in total destruction or separation of the contaminants in the waste stream, consequently post-treatment is often required. Type of physical treatment included in this system are filtration, sedimentation, flocculation, precipitation, equalization, evaporation, stripping, soil washing, and carbon adsorption. Includes process equipment and chemicals required for treatment. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).
331XX	14				<p><b>THERMAL TREATMENT</b></p> <p>Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.14.(01.-07.)).</p> <p>Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.14.50.). Thermal treatment is the destruction of wastes through exposure to high temperature in combustion chambers and energy recovery devices. Several processes capable of incinerating a wide range of liquid and solid wastes include fluidized bed, rotary kiln, multiple hearth, infrared, circulating bed, liquid injection, pyrolysis, plasma torch, wet air oxidation, supercritical water oxidation, molten salt destruction, and solar detoxification.</p> <p>Includes process equipment and chemicals required for treatment. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).</p>
331XX	15				<p><b>STABILIZATION/FIXATION/ENCAPSULATION</b></p> <p>Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.15.(01.-07.)).</p> <p>Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.15.50.). Stabilization/fixation/encapsulation processes attempt to improve the handling and physical characteristics of the wastes, decrease the surface area, limit the solubility of any pollutants and detoxify contained pollutants. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).</p>
331XX	16				<b>RESERVED FOR FUTURE USE</b>
331XX	17				<p><b>DECONTAMINATION AND DECOMMISSIONING (D&amp;D)</b></p> <p>Decontamination and decommissioning during remedial action are all activities</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					associated with shutdown and final cleanup of a nuclear or other facility. Includes facility shutdown and dismantling activities, preparation of decommissioning plans, procurement of equipment and materials, research and development, spent fuel handling, and hot cell cleanup.
331XX	18				<p><b>DISPOSAL (OTHER THAN COMMERCIAL)</b></p> <p>Includes operation (separate items for each subsystem disposal method) of the plant facility during the remedial action phase, based on the volume of waste material disposed, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.18.(01.-10.)).</p> <p>Includes a separate item for the construction of a permanent disposal facility, including permanent disposal equipment, which is purchased for one disposal facility only (331XX.18.15.). Disposal (Other than Commercial) provides for the final placement of HTRW or ordnance at facilities owned or controlled by the Government. An example would be the disposal of wastes through burial at a DOE nuclear facility or ordnance disposal at DOD facilities. Includes handling, disposal fees, and transportation to the final Destruction/Disposal/Storage facility. Excluded is the transportation to a facility for treatment prior to final disposal. For transportation prior to final disposal see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04). Disposal may be accomplished through the use of secure landfills, burial grounds, trench, pits, above ground vault, underground vault, underground mine/shaft, tanks, pads (tumulus / retrievable storage, other), storage buildings or protective cover structures, cribs, deep well injection, incinerator, or other.</p>
331XX	19				<p><b>DISPOSAL (COMMERCIAL)</b></p> <p>Commercial disposal during remedial action provides for the final placement of HTRW at third party commercial facilities that charge a fee to accept waste depending on a variety of waste acceptance criteria. Fees are assessed based on different waste categories, methods of handling, and characterization. Disposal may be accomplished through the use of secure landfills, surface impoundments, deep well injection, or incineration. Includes transportation to the final Destruction/Disposal/Storage facility. Excludes transportation to a facility for treatment prior to disposal. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).</p>
331XX	20				<p><b>SITE RESTORATION</b></p> <p>Site restoration during remedial action includes topsoil, seeding, landscaping, restoration of roads and parking, and other hardscaping disturbed during site remediation. Note that all vegetation and planting is to be included as well as the installation of any site improvement damaged or altered during construction. All vegetation and planting for the purpose of erosion control during construction activities should be placed under "Erosion Control" (331XX.05.13).</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					Treated soil used as backfill will be placed under "Disposal (Other than Commercial)" (331XX.18). All new site improvements, those not disturbed during construction, are to be included under "Sitetwork" (331XX.03).
331XX	21				<b>DEMOBILIZATION</b> Provides for all work associated with remedial action plant takedown and removal of temporary facilities, utilities, equipment, material, and personnel.
331XX	22				<b>GENERAL REQUIREMENTS (Optional Breakout)</b> Consists of general remedial action requirements which are not specifically identifiable in the other systems such as indirect, overhead, profit, and other general requirements. This system is OPTIONAL. It may be used to separately show general requirements; however, if it is not used, general requirements must be distributed throughout in the other systems.
331XX	9X				<b>OTHER (Use Numbers 90-99)</b> Includes all Hazardous, Toxic, Radioactive Waste Remedial Action work not described by the above listed systems.
331XX	01				<b>MOBILIZATION AND PREPARATORY WORK</b> Includes all preparatory work required during remedial action or construction. This includes submittals, construction plans, mobilization of personnel, facilities and equipment, construction of temporary facilities, temporary utilities, temporary relocations, and setup of decontamination facilities and construction plant.
331XX	01	01	Each item mobilized	EA (EA)	<b>MOBILIZATION OF CONSTRUCTION EQUIPMENT AND FACILITIES</b> Mobilization of equipment and facilities during remedial action is the transport, initial assembly and setup of construction equipment prior to project startup. Work associated with mobilization will include preparation of equipment for transport, equipment transportation and setup, manifests, tolls, permits, escort vehicles, drivers, and equipment operators.
331XX	01	02	Number of personnel	EA (EA)	<b>MOBILIZATION OF PERSONNEL</b> Mobilization of personnel during remedial action includes relocation of supervisory personnel and workmen.
331XX	01	03	Each plan	EA (EA)	<b>SUBMITTALS/IMPLEMENTATION PLANS</b> Submittal/implementation plans is work incurred during remedial action for obtaining all necessary plans and permits. These include QA/QC plans, work plans, shop drawings, demolition plans, environmental control plans, pollution control plans, site safety and health plans, site security plan, materials handling/transportation/disposal plan and all local, state, and federal permits.
331XX	01	04	Each facility	EA (EA)	<b>SETUP/CONSTRUCT TEMPORARY FACILITIES</b>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					Setup/construct temporary facilities during remedial action includes procurement, setup, and construction of office trailers, storage areas, fencing, access roads, decontamination facilities, decontamination staging areas and other temporary facilities.
331XX	01	05	Each utility	EA (EA)	<b>CONSTRUCT TEMPORARY UTILITIES</b> Temporary utilities are power and lighting, telephone, water, sewer and gas services that will be in place only during construction or remedial action.
331XX	01	06	Each relocation	EA (EA)	<b>TEMPORARY RELOCATIONS OF ROADS/ STRUCTURES/UTILITIES</b> Provides for the temporary relocation during remedial action of roads, bridges, buildings, structures and utilities. For re-establishing roads/structures/utilities, see "Re-establish Roads/Structures/Utilities" (331XX.20.03).
331XX	01	07	Each plant	EA (EA)	<b>CONSTRUCTION PLANT ERECTION</b> Construction plant erection during remedial action provides for the transport, erection and testing of construction plants prior to startup. Construction plants can include concrete batch plants, block plants, asphalt plants, screening plants, crushing plants and pugmills.
331XX	01	08	Each control	EA (EA)	<b>INSTITUTIONAL CONTROLS</b> Measures taken during remedial action to protect the public health and safety as an interim action at an HTRW site. This can include such measures as posting warning signs, placing fencing around the site, etc.
331XX	01	09	Each resident or user	EA (EA)	<b>ALTERNATE WATER SUPPLY</b> Includes providing residents or other users during remedial action with water if the existing water source has been contaminated. This could include providing bottled water or installing a replacement water distribution system, etc.
331XX	01	10	Each resident or user	EA (EA)	<b>POPULATION RELOCATION</b> Includes relocation during remedial action of residents or users due to contamination of a site.
331XX	01	9X			<b>OTHER (Use Numbers 90-99)</b> Includes remedial action mobilization and preparatory work not described by the above listed subsystems.
331XX	02				<b>MONITORING, SAMPLING, TESTING, AND ANALYSIS</b> Provides for all work during remedial action associated with air, water, sludge, solids and soil sampling, monitoring, testing, and analysis. Includes sample taking, shipping samples and sample analysis by on-site and off-site laboratory facilities.

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	02	01	Each monitoring station	EA (EA)	<b>METEOROLOGICAL MONITORING</b> Meteorological monitoring during remedial action includes measurement of wind, precipitation, and barometric pressure as well as other parameters. Includes the procurement, setup, testing, and operation of meteorological stations and instrument shelters.
331XX	02	02	Each monitoring event	EA (EA)	<b>RADIATION MONITORING</b> Radiation monitoring during remedial action includes the measuring of radiation of personal body count levels and at specified site areas. Body count monitoring includes personal dosimetry systems, hand and/or foot counters and whole body counters. Area monitoring includes remote monitoring, alarm systems, survey monitoring and special case area monitoring.
331XX	02	03	Each monitoring event	EA (EA)	<b>AIR MONITORING AND SAMPLING</b> Air monitoring and sampling during remedial action is the monitoring for detection of HTRW to ensure compliance with clean air regulations. Includes monitoring of asbestos. HTRW, contaminated dust gases and vapors. See "Asbestos Abatement" (331XX.10.04) for air monitoring during asbestos abatement.
331XX	02	04	Each monitoring well	EA (EA)	<b>MONITORING WELLS</b> Provides for all work associated with the drilling, construction, and operation during remedial action construction of monitoring wells.
331XX	02	05	Each sample	EA (EA)	<b>SAMPLING SURFACE WATER/GROUNDWATER/LIQUID WASTE</b> Sampling surface water/groundwater/liquid waste during remedial action includes the work associated with the retrieval of liquid waste samples. This also includes sampling of leachate and treatment process effluents, and sample shipping.
331XX	02	06	Each sample	EA (EA)	<b>SAMPLING SOIL AND SEDIMENT</b> Sampling soil and sediment during remedial action includes all work associated with the retrieval of surface and subsurface soil and sediment/sludge samples. This includes any subsurface exploration, split spoon sampling, auger boring samples, the digging of sampling test pits and shipping to testing lab.
331XX	02	07	Each sample	EA (EA)	<b>SAMPLING ASBESTOS</b> Sampling asbestos during remedial action includes all activities associated with the retrieval of asbestos samples, excluding air sampling, which is covered under "Air Monitoring and Sampling" (331XX.02.03). Includes shipping to testing labs.

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	02	08	Each sample	EA (EA)	<b>SAMPLING RADIOACTIVE CONTAMINATED MEDIA</b> Sampling radioactive contaminated media during remedial action includes all activities associated with the gathering of contaminated radioactive media samples. This includes materials, labor and equipment for taking samples, plus packaging and shipping to testing lab.
331XX	02	09	Each analysis	EA (EA)	<b>LABORATORY CHEMICAL ANALYSIS</b> Laboratory chemical analysis during remedial action consists of work by an independent laboratory for analysis of contaminated samples. This includes air/industrial hygiene analysis, general water and wastewater quality analysis, priority pollutant analysis (all media), biomonitoring and bioassay analysis, Resource Conservation and Recovery Act (RCRA) analysis, miscellaneous waste analysis, and soil and sediment analysis. Does not include storage and disposal of lab samples. See "Off-Site Laboratory Facilities" (331XX.02.14).
331XX	02	10	Each analysis	EA (EA)	<b>RADIOACTIVE WASTE ANALYSIS</b> Radioactive waste analysis consists of work during remedial action by an independent laboratory for the analysis of radioactive contaminated waste samples. This includes analysis of radioactive animal tissue/bone, air, liquid, urine/feces and vegetation/sediment/soil. Does not include storage and disposal of lab samples. See "Off-Site Laboratory Facilities" (331XX.02.14).
331XX	02	11	Each test	EA (EA)	<b>GEOTECHNICAL TESTING</b> Geotechnical testing during remedial action consists of work by an independent laboratory for the analysis of soil properties. Included are analysis of shear strength, permeability, consolidation and soil classification.
331XX	02	12	Each Instrument	EA (EA)	<b>GEOTECHNICAL INSTRUMENTATION</b> Geotechnical instrumentation during remedial action is used to record measurable changes in soil, surface water and groundwater. Geotechnical instrumentation includes piezometers, inclinometers, settlement gauges, and vadose zone monitors.
331XX	02	13	Each laboratory	EA (EA)	<b>ON-SITE LABORATORY FACILITIES</b> Provides during remedial action rental/ownership, setup, certification/approval/evaluation, equipment, and operation during construction of an on-site laboratory service.
331XX	02	14	Each laboratory	EA (EA)	<b>OFF-SITE LABORATORY FACILITIES</b> Provides during remedial action for the storage and/or disposal of contaminated samples at an off-site laboratory. Commercial laboratory analysis fees are included in "Laboratory Chemical Analysis" (331XX.02.09) and "Radioactive Waste Analysis" (331XX.02.10).

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	02	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all monitoring, sampling, testing, and analysis during remedial action not described by the above listed subsystems.
331XX	03				<b>SITEWORK</b> Sitework during remedial action consists of site preparation, site improvements, and site utilities. Site preparation includes demolition, clearing, and earthwork. Site improvements include roads, parking, curbs, gutters, walks and other hardscaping. Site utilities include water, sewer, gas and other utility distribution. Also includes new fuel storage tanks. All work involving contaminated or hazardous substances is excluded from this system. Storm drainage involving contaminated surface water is included under "Surface Water Collection and Control" (331XX.05). Note that topsoil, seeding, landscaping and reestablishment of existing structures altered during remediation activities are included in "Site Restoration" (331XX.20).
331XX	03	01	Area of demolition	SY (M2)	<b>DEMOLITION</b> Demolition during remedial action is the removal of existing structures, pavements, underground utilities, and other miscellaneous items. Also includes handling, loading, hauling, and landfill dumping fees. Excludes any work involving contaminated or hazardous materials.
331XX	03	02	Total area to cleared and grubbed	ACR (HEC)	<b>CLEARING AND GRUBBING</b> Construction during remedial action. Clearing and grubbing is the removal of trees, stumps, vegetation, and other unsuitable organic material. Excludes any work involving contaminated or hazardous materials.
331XX	03	03	Volume of material	CY (M3)	<b>EARTHWORK</b> Construction during remedial action. Includes stripping topsoil, excavation, backfill, compaction, fine grading, hauling spoil, importation of borrow material and topsoil. Excludes any work involving contaminated or hazardous materials.
331XX	03	04	Area of surfacing	SY (M2)	<b>ROADS/PARKING/CURBS/WALKS</b> Construction during remedial action. Roads/parking/curbs/walks include bituminous, aggregate, and concrete surfacing as well as costs for base courses, geotextile fabrics, curbs and gutters, striping, guard rails and barricades.
331XX	03	05	Total length of fence	LF (M)	<b>FENCING</b> Construction during remedial action. Includes augering post holes, gate posts, line posts, top rail, fabric, apron and gates.
331XX	03	06	Total length of distribution	LF (M)	<b>ELECTRICAL DISTRIBUTION</b>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					Construction during remedial action. Includes wire, conduit, fittings, manholes, site lighting fixtures, pole base/foundations, trenching, backfill, testing, transformer, switchgear, aerial distribution, underground distribution and connection fees. Includes distribution up to the point of connection to the treatment equipment's main power or control panel. Excludes temporary connections.
331XX	03	07	Total length of distribution	LF (M)	<b>TELEPHONE/COMMUNICATION DISTRIBUTION</b> Construction during remedial action. Includes wire, conduit, fittings, manholes, trenching, backfill, testing, and connection fees. Includes distribution up to the point of connection to the treatment equipment's main power or control device (panel, valve, etc.). Excludes temporary connections.
331XX	03	08	Total length of distribution	LF (M)	<b>WATER/SEWER/GAS DISTRIBUTION</b> Construction during remedial action. Includes piping, fittings, valves, manholes, excavation, backfill, and connection fees. Includes distribution up to the point of connection to the treatment equipment's main control device (valve, etc.). Excludes temporary connections.
331XX	03	09	Total length of distribution	LF (M)	<b>STEAM AND CONDENSATE DISTRIBUTION</b> Construction during remedial action. Includes piping, fittings, insulation, valves, testing, pipe supports, steam tunnel, connection fees, excavation and backfill. Includes distribution up to the point of connection to the treatment equipment's main control device (valve, etc.). Excludes temporary connections.
331XX	03	10	Total length of distribution	LF (M)	<b>FUEL LINE DISTRIBUTION</b> Construction during remedial action. Includes piping, fittings, valves, manhole/valve box, testing, connection fees, excavation and backfill. Includes distribution up to the point of connection to the treatment equipment's main control device (valve, etc.). Excludes temporary connections.
331XX	03	11	Total length of drainage/subdrainage channels	LF (M)	<b>STORM DRAINAGE/SUBDRAINAGE</b> Construction during remedial action. Includes piping, manholes, junction boxes, invert construction, grates, covers, headwalls, flumes, rip rap, excavation, backfill, and testing. Excludes any work involving hazardous or contaminated materials.
331XX	03	12	Area of structure	SF (M2)	<b>PERMANENT COVER STRUCTURE OVER CONTAINMENT AREA</b> Includes the remedial action construction of a permanent structure over a solid waste containment area. Examples would be the construction of an asphalt parking lot over a RCRA cap or an air-supported structure over a contaminated excavation.

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	03	13	Total area of borrow pits and/or haul roads	ACR (HEC)	<b>DEVELOPMENT OF BORROW PIT/HAUL ROADS</b> Includes all work associated with the remedial action construction of borrow pit and haul roads such as clearing, earthwork, storm drainage, design, and testing.
331XX	03	14	Each tank	EA (EA)	<b>FUEL STORAGE TANKS (NEW)</b> Construction during remedial action. Includes new fuel storage tanks and associated fill/vent piping, overflow protection valves, spill protection systems, alarms, manways, concrete pad and anchors, and miscellaneous straps and fasteners.
331XX	03	9X			<b>OTHER (Use Numbers 90-99)</b> Includes remedial action sitework not described by the above listed subsystems.
331XX	04				<b>ORDNANCE AND EXPLOSIVE - CHEMICAL WARFARE MATERIAL (OE - CWM) REMOVAL AND DESTRUCTION</b> Includes the locating, removing, and destruction of all ordnance, conventional or chemical, fused or unfused, related scrap, propellants, and delivery vehicles during remedial action. Providing for public involvement, providing subsurface data for the delineating the extent of the contamination. Also includes the construction of temporary explosive storage bunkers and surveys.
331XX	04	01	Area of Removal	ACR (HEC)	<b>ORDNANCE REMOVAL AND DESTRUCTION</b> Includes locating, excavation, and destruction of all types of ordnance and ordnance related items or scrap during remedial action. Locating includes the use of existing technology or approved innovative technology. Destruction includes blow in place, on site open burn/open detonation areas, or removal to an off site location for disposal/destruction. Excavation includes the use of conventional heavy equipment, specialty equipment designed to remove ordnance, and hand methods.
331XX	04	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all remedial action ordnance removal and destruction not described by the above listed subsystem.
331XX	05				<b>SURFACE WATER COLLECTION AND CONTROL</b> Provides for the remedial action collection and control of contaminated surface water through the construction of storm drainage piping and structures, erosion control measures, and civil engineering structures such as berms, dikes, and

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					levees. Includes the collection of surface water through the construction of lagoons, basins, tanks, dikes, and pump systems. Includes transport to treatment plant.
331XX	05	01	Length of berm/dike	LF (M)	<b>BERMS/DIKES</b> Construction during remedial action. Berms and dikes are used to control contaminated surface water by diverting its flow. Its primary purpose in environmental remedial action is the diversion of surface runoff that has entered a contaminated area and must be collected. Includes excavation and backfill, hauling, drainage facing materials, etc.
331XX	05	02	Area of one side of the wall	SF (M2)	<b>FLOODWALLS</b> Construction during remedial action. Floodwalls are structures used to protect land from flooding and inundation. Includes excavation and backfill, hauling, concrete or other structures, etc.
331XX	05	03	Length of levee	LF (M)	<b>LEVEES</b> Construction during remedial action. Levees are used to prevent a body of contaminated water from overflowing. Includes excavation and backfill, hauling, drainage facing materials, etc.
331XX	05	04	Length of terraces/benches	LF (M)	<b>TERRACES AND BENCHES</b> Construction during remedial action. Terraces and benches are used for the control of contaminated surface water runoff by intercepting the flow of water before it causes erosion. Includes site preparation, excavation and backfill, hauling, soil stabilization, geotechnical testing, drainage facing materials, etc.
331XX	05	05	Length of channels/waterways	LF (M)	<b>EXCAVATION FOR CHANNELS/WATERWAYS (SOIL/ROCK)</b> Includes remedial action excavation of soil or rock, stockpiling, loading, and hauling.
331XX	05	06	Length of chutes and flumes	LF (M)	<b>CHUTES OR FLUMES</b> Construction during remedial action. Chutes and flumes are natural or man-made channels that divert contaminated water away from a given area. Includes grading, earthwork, concrete, formwork, reinforcing steel, and rip rap.
331XX	05	07	Length of barriers	LF (M)	<b>SEDIMENT BARRIERS</b> Construction during remedial action. Sediment barriers control the amount of sediments that are suspended and transported by the flow of contaminated surface water. Includes silt fencing, installation of straw bales, and excavation/grading of temporary sediment basins.
331XX	05	08	Length of drainage	LF (M)	<b>STORM DRAINAGE</b> Includes remedial action construction of piping, junction boxes, manholes,

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	05	09	Area of facility	ACR (HEC)	inlets, invert construction, grates, covers, headwalls, rip rap, excavation, and backfill.
331XX	05	10	Volume of waste material	MGA (KLI)	<p><b>LAGOONS/BASINS/TANKS/DIKES/PUMP SYSTEM</b></p> <p>Construction during remedial action of lagoons/basins/tanks/dikes are used for the storage of liquid wastes. Includes earth structures, liners, spillways, intake/outlet structures, underground tanks, aboveground tanks, concrete retention basins, and overtopping alarm systems. Also includes construction of pumping stations and controls, lift stations and controls, manholes, piping and fittings, hosing, and holding tanks.</p>
331XX	05	11	Volume of waste material	MGA (KLI)	<p><b>PUMPING/DRAINING/COLLECTION</b></p> <p>Includes work associated with pumping or draining aboveground or underground tanks and basins during remedial action.</p>
331XX	05	12	Volume of material	CY (M3)	<p><b>TRANSPORT TO TREATMENT PLANT</b></p> <p>Transport to treatment plant during remedial action includes equipment, materials, and labor for hauling, loading and unloading of liquid wastes.</p>
331XX	05	13	Total area	ACR (HEC)	<p><b>EARTHWORK</b></p> <p>Construction during remedial action. Includes stripping topsoil, excavation, backfill, compaction, fine grading, hauling spoil, importation of borrow material and topsoil.</p>
331XX	05	14	Total area of borrow pits and/or haul roads	ACR (HEC)	<p><b>EROSION CONTROL</b></p> <p>Includes remedial action establishment of turf and installation of trees, shrubs, and ground covers. Also includes mowing of established turf.</p>
331XX	05	9X			<p><b>DEVELOPMENT OF BORROW PIT/HAUL ROADS</b></p> <p>Includes all work associated with the remedial action construction of borrow pit and haul roads such as clearing, earthwork, storm drainage, design, and testing.</p>
331XX	06				<p><b>OTHER (Use Numbers 90-99)</b></p> <p>Includes all remedial action surface water collection and control not described by the above listed subsystems.</p>
					<p><b>GROUNDWATER COLLECTION AND CONTROL</b></p> <p>Provides for the remedial action collection and control of contaminated groundwater through the construction of piping, wells, trenches, slurry walls, sheet piling and other physical barriers. Includes the collection of groundwater through the construction of lagoons, basins, tanks, dikes, and pump systems. Includes transport to treatment plant.</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	06	01	Each well	EA (EA)	<b>EXTRACTION AND INJECTION WELLS</b> Construction during remedial action. Injection wells are for injecting liquid wastes deep underground between geologically impermeable layers, usually of clay or shale, to contain or remove the contaminant plume, to direct contaminants to the extraction wells, or to lower the water table to prevent it from intercepting buried HTRW. Extraction wells are utilized for pump and treat operations. Extraction and injection wells include drilling rig setup, well drilling, well construction, handling of cuttings/water, casing, casing removal, gravel pack material, grout, wet well, well development/testing, well screen, capping, well house, well pump and instrumentation, well piping, valves and fittings, electrical, operation during construction, and well abandonment.
331XX	06	02	Length of drainage/collection system	LF (M)	<b>SUBSURFACE DRAINAGE/ COLLECTION</b> Drainage/collection includes items associated with the remedial action construction of a site subsurface gravity drainage and collection system. Assemblies include trench excavation and shoring, geotextile fabrics, liners, manholes, piping and fittings, hoses, and holding tanks.
331XX	06	03	Surface area of slurry wall one side	SF (M2)	<b>SLURRY WALLS</b> Construction during remedial action. Slurry walls are narrow vertical trenches, typically 24-36 inches wide, excavated through pervious materials to a relatively impervious underlying strata and backfilled with a soil/bentonite or cement/bentonite slurry mixture. This provides a vertical barrier to reduce the horizontal permeability of soil. Slurry wall construction includes excavation, bentonite slurry makeup, and backfill/slurry displacement. The operation of batch plant equipment such as storage tanks, ponds, grout plants, circulation pumps and batchmixers are also included.
331XX	06	04	Surface area of grout curtain one side	SF (M2)	<b>GROUT CURTAIN</b> Construction during remedial action. A grout curtain is an impenetrable barrier placed to prevent further contaminant migration by drilling into pervious rock formations at spaced intervals and injecting cement-based grouts under pressure. Grout curtain items include drilling rig, grout materials, on-site batch plants, grout pumps, and grout injection monitors.
331XX	06	05	Surface area of sheet piling one side	SF (M2)	<b>SHEET PILING</b> Construction during remedial action. Sheet piling serves as an impervious barrier for contaminant migration once it is driven to an impervious underlaying strata. Includes all materials, labor and equipment to drive sheet piling and pull/salvage, if required.
331XX	06	06	Area of facility	ACR (HEC)	<b>LAGOONS/BASINS/TANKS/DIJKES/PUMP SYSTEM</b> Construction during remedial action of lagoons/basins/tanks/dikes are used for HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					the storage of liquid phase groundwater wastes. Assemblies include earth structures, liners, spillways, intake/outlet structures, overtopping alarm systems, underground tanks, aboveground tanks, and concrete retention basins. Also includes the construction of a site pumping and collection system. Assemblies include pumping stations and controls, lift stations and controls, manholes, piping and fittings, hosing, and holding tanks.
331XX	06	07	Volume of waste material	MGA (KLI)	<b>PUMPING/COLLECTION</b> Pumping/collection during remedial action includes work associated with collecting groundwater.
331XX	06	08	Volume of waste material	MGA (KLI)	<b>TRANSPORT TO TREATMENT PLANT</b> Transport to treatment plant during remedial action includes equipment, materials, and labor for hauling, loading and unloading of wastes.
331XX	06	09	Total area of borrow pits and/or haul roads	ACR (HEC)	<b>DEVELOPMENT OF BORROW PIT/HAUL ROADS</b> Includes all work associated with the remedial action construction of borrow pit and haul roads such as clearing, earthwork, storm drainage, design, and testing.
331XX	06	9x			<b>OTHER (Use Numbers 90-99)</b> Includes all remedial action groundwater collection and control not described by the above listed subsystems.
331XX	07				<b>AIR POLLUTION/GAS COLLECTION AND CONTROL</b> Includes the remedial action construction for the collection and control of gas, vapor and dust.
331XX	07	01	Length of trench	LF (M)	<b>GAS/VAPOR COLLECTION TRENCH SYSTEM</b> Gas/vapor collection trench systems constructed during remedial action consist of deep narrow trenches backfilled with gravel, to form a path of least resistance through which gases move upward to a collection apparatus. Assemblies include excavation, backfill, geotextile linings, well point dewatering and a ventilation system for the site.
331XX	07	02	Number of wells	EA (EA)	<b>GAS/VAPOR COLLECTION WELL SYSTEM</b> Gas/vapor collection well systems constructed during remedial action permit the venting of underground gases to a collection well system in order to prevent migration or buildup. Collection and monitoring wells will include drilling rig setup, well drilling, handling of cuttings/water, casing, casing removal, gravel pack material, grout, wet well, well development/testing, well screen, capping, well house, well pump and instrumentation, well piping, valves and fittings and electrical. Also included are blowers and/or compressors, piping, metering, and

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					control systems. This should not be confused with the soil vapor extraction process listed under "Vapor Extraction" (331XX.13.23).
331XX	07	03	Area of collection system coverage	SY (M2)	<b>GAS/VAPOR COLLECTION AT LAGOON COVER</b> Provides for the labor, material and equipment used during remedial action to construct the subsystem for the venting of gases and vapors at lagoon covers to prevent migration or buildup. Assemblies include collection hose, tank, vacuum blower/compressor, valves, boxes, and manholes.
331XX	07	04	Area of emissions control system coverage	ACR (HEC)	<b>FUGITIVE DUST/VAPOR/GAS EMISSIONS CONTROL</b> Fugitive dust/vapor/gas emissions control systems constructed during remedial action prevent the spread of airborne contaminants. Assemblies include sprayed chemical dust suppressants, wind fences/screens, synthetic covers over waste piles, and water spraying.
331XX	07	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all remedial action air pollution and gas collection and control not described by the above listed subsystems.
331XX	08				<b>SOLIDS COLLECTION AND CONTAINMENT</b> Provides for exhuming and handling of solid hazardous, toxic and radioactive waste (HTRW) during remedial action through excavation, sorting, stockpiling, and filling containers. Provides for containment of solid waste through the construction of multilayered caps as well as dynamic compaction of burial grounds, cribs, or other waste disposal units. Includes transport to treatment plant.
331XX	08	01	Volume of waste material	CY (M3)	<b>CONTAMINATED SOIL COLLECTION</b> Includes the removal during remedial action of solid contaminated soil HTRW waste by front end loader, backhoe, gradall, clamshell, dragline or other mechanical means.
331XX	08	02	Volume of waste material	CY (M3)	<b>WASTE CONTAINMENT, PORTABLE (FURNISH/FILL)</b> Waste containment includes the procurement of and labor to fill containers during remedial action with solid HTRW wastes. Examples of containers are open top sludge containers, closed top sludge containers, roll-off containers, open head drums, spill containment vessels, spill containment pallets, storage tanks, drum liners, over packs and lab packs.
331XX	08	03	Volume of waste material	CY (M3)	<b>TRANSPORT TO TREATMENT PLANT</b> Transport to treatment plant during remedial action includes equipment, materials and labor for hauling, loading and unloading of solid waste.
331XX	08	04	Volume of waste material	CY (M3)	<b>RADIOACTIVE SPECIFIC WASTE CONTAINMENT</b>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					<b>(FURNISH/FILL)</b> Radioactive specific waste containment includes the procurement of and labor to fill containers during remedial action with low level and high level radioactive solid waste. Examples of containers are Low Specific Activity (LSA) waste containers, LSA drum over packs, LSA laundry containers, strong-tight containers, Type A containers, Type B shipping containers, lead-shielded containers, reusable containers and special use containers.
331XX	08	05	Area of cap or liner	ACR (HEC)	<b>CAPPING OF CONTAMINATED AREA/WASTE PILE (SOIL/ASPHALT CAP)</b> Includes the remedial action construction of multilayered caps and bottom liners designed to contain solid waste in place, to prevent the migration of precipitation, or entry of vegetation or animals into the waste cell, and to collect and distribute any leachate generated by the waste. Includes procurement of materials, loading, hauling, spreading, compaction of cap layers, establishment of turf, and containment systems (liners) beneath waste piles or landfills. Cap layers and bottom liners include impervious clay layers, bentonite layer, granular drainage layers, geotextile membrane, flexible membrane liners, radon barrier, revegetation, erosion control, drainage and leachate collection system, manholes, sumps, lift stations, paving cover, blast protective cover and testing.
331XX	08	06	Volume of waste material	CY (M3)	<b>NUCLEAR WASTE DENSIFICATION (DYNAMIC COMPACTION)</b> Dynamic compaction is a remedial action technology that precedes the installation of a protective cap. Dynamic compaction is a method of densifying a waste disposal cell by means of dropping a large weight (several tons) a specified distance over the site area occupied by the disposal cell. The purpose of dynamic compaction is to densify the soil, HTRW or other debris in order to prevent settlement of the disposal cell which could damage a protective cap and allow migration of contaminants over time. Includes all labor and equipment to accomplish dynamic compaction of a site. The technology can be applied to both nuclear and hazardous waste.
331XX	08	07	Total area of borrow pits and/or haul roads	ACR (HEC)	<b>DEVELOPMENT OF BORROW PIT/HAUL ROADS</b> Includes all work during remedial action associated with the construction of borrow pit and haul roads such as clearing, earthwork, storm drainage, design, and testing.
331XX	08	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all remedial action solids collection and containment not described by the above listed subsystems.
331XX	09				<b>LIQUIDS/SEDIMENTS/SLUDGES COLLECTION AND CONTAINMENT</b> Includes collection during remedial action of HTRW-contaminated liquids and

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					sludges through dredging and vacuuming, and the furnishing and filling of portable containers. Includes the containment of liquids and sludges through the construction of lagoons, basins, tanks, dikes, and drain system. Includes transport to treatment plant.
331XX	09	01	Volume of waste material	CY (M3)	<b>DREDGING/EXCAVATING</b> Dredging during remedial action is the removal of sediment and sludges with overlying water. Dredging may be used for the removal of sediments in contaminated settling basins, lagoons and retention ponds. Includes hydraulic, mechanical and pneumatic dredges using cutterheads, bucket dredges, wheel dredges and suction dredging.
331XX	09	02	Volume of waste material	CY (M3)	<b>INDUSTRIAL VACUUMING</b> Industrial vacuuming during remedial action is the process of removal of industrial wastes contained in tanks, containers, surface impoundments or process vessels by pumping or pneumatic conveyance.
331XX	09	03	Volume of waste material	MGA (KLI)	<b>WASTE CONTAINMENT, PORTABLE (FURNISH/FILL)</b> Waste containment during remedial action includes the procurement of and labor to fill containers with liquid waste, sediments and sludges. Types of waste containers include open top sludge containers, closed top sludge containers, roll-off containers, open head drums, spill containment vessels, spill containment pallets, storage tanks, drum liners, over packs and lab packs.
331XX	09	04	Volume of waste material	MGA (KLI)	<b>TRANSPORT TO TREATMENT PLANT</b> Transport to treatment plant during remedial action includes equipment, materials and labor for hauling, loading and unloading of liquid waste, sediments and sludges.
331XX	09	05	Volume of waste material	MGA (KLI)	<b>RADIOACTIVE SPECIFIC WASTE CONTAINMENT (FURNISH/FILL)</b> Radioactive specific waste containment during remedial action includes the procurement of and labor to fill containers with low level and high level radioactive liquid waste. Examples of containers are Low Specific Activity (LSA) waste containers, LSA drum over packs, LSA laundry containers, strong-tight containers, Type A containers, Type B shipping containers, lead-shielded containers, reusable containers and special use containers.
331XX	09	06	Volume of waste material	MGA (KLI)	<b>PUMPING/DRAINING/COLLECTION</b> Pumping/drainage/collection includes work associated with removing liquid wastes from drums, tanks, and basins during remedial action.
331XX	09	07	Area of facility	ACR (HEC)	<b>LAGOONS/BASINS/TANKS/DIKES/PUMP SYSTEM</b> Construction during remedial action of lagoons/basins/tanks/dikes which are used for the storage of liquid wastes. Includes earth structures, liners,

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					spillways, intake/outlet structures, yard piping, pumping and lift stations, and overtopping alarm systems. Also includes the construction of a site drainage and collection system. Assemblies include pumping stations and controls, lift stations and controls, manholes, piping and fittings, hosing, and holding tanks.
331XX	09	08	Total area of borrow pits and/or haul roads	ACR (HEC)	<b>DEVELOPMENT OF BORROW PIT/HAUL ROADS</b> Includes all work associated with the remedial action construction of borrow pit and haul roads such as clearing, earthwork, storm drainage, design, and testing.
331XX	09	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all remedial action for liquids, sediments, and sludges collection and containment not described by the above listed subsystems.
331XX	10				<b>DRUMS/TANKS/STRUCTURES/MISCELLANEOUS DEMOLITION AND REMOVAL</b> Includes the demolition and removal during remedial action of HTRW contaminated drums, tanks, contaminated paint removal, and other structures by excavation and downsizing. Does not include filling portable hazardous waste containers or transport of wastes to treatment or disposal facilities. See "Solids Collection and Containment" (331XX.08), "Disposal (Other than Commercial)" (331XX.18) and "Disposal (Commercial)" (331XX.19).
331XX	10	01	Number of drums	EA (EA)	<b>DRUM REMOVAL</b> Drum removal during remedial action includes locating buried or submerged drums, machine and hand excavation of buried drums, handling of drums, drum cleaning and decontamination, and all necessary drum crushing and shredding. Excludes removal of drum contents, see 331XX.09.06.
331XX	10	02	Number of tanks	EA (EA)	<b>TANK REMOVAL</b> Tank removal during remedial action includes locating buried or submerged tanks, machine and hand excavation of buried tanks, tank cleaning and decontamination, tank cutting/demolition and tank crushing. Excludes removal of drum contents, see 331XX.09.06.
331XX	10	03	Gross floor area of structure	SF (M2)	<b>STRUCTURE REMOVAL</b> Structure removal during remedial action is the decontamination and demolition of existing structures. Examples are buildings, pump stations, and outfall structures.
331XX	10	04	Contact area of asbestos contamination	SF (M2)	<b>ASBESTOS ABATEMENT</b> Asbestos abatement during remedial action includes isolation of work area, asbestos removal or encapsulation, cleanup, disposal of wastes, and final inspections. Also included are HEPA filtration devices, vacuums, air

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					monitoring equipment and amended water.
331XX	10	05	Length of pipe	LF (M)	<b>PIPING AND PIPELINE REMOVAL</b> Piping/pipeline removal during remedial action includes locating buried or above ground piping, machine and hand excavation of buried piping, cutting, demolition, and handling of pipe, and removal of concrete pipe pits.
331XX	10	06	Volume of waste material	CY (M3)	<b>RADIOACTIVE SPECIFIC WASTE CONTAINMENT (FURNISH/FILL)</b> Radioactive specific waste containment includes the procurement of and labor to fill containers during remedial action with low level and high level radioactive waste not covered in "Solids Collection and Containment" (331XX.08) and "Liquids/Sediments/Sludges Collection and Containment" (331XX.09). Examples of containers are Low Specific Activity (LSA) waste containers, LSA drum overpacks, LSA laundry containers, strong-tight containers, Type A containers, Type B shipping containers, lead-shielded containers, reusable containers and special use containers.
331XX	10	07	Total contaminated area	ACR (HEC)	<b>MISCELLANEOUS ITEMS</b> Miscellaneous items include all remedial action items for demolition and removal of contaminated items that do not directly pertain to the above subsystems. Includes pressurized gas cylinders, debris, and pavement removal.
331XX	10	08	Contact area of contaminated paint	SF (M2)	<b>CONTAMINATED PAINT REMOVAL</b> Includes remedial action removal or encapsulation of lead (or other contaminant) contaminated paint which has been previously applied to a surface. Includes pressurized gas cylinders, debris, and pavement removal.
331XX	10	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all remedial action demolition and removal of drums, tanks, and structures not described by the above listed subsystems.
331XX	11				<b>BIOLOGICAL TREATMENT</b> Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.11.(01.-14.)). Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.11.50.). Biological treatment is the microbial transformation of

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					organic compounds. Biological treatment processes can alter inorganic compounds such as ammonia and nitrate, and can change the oxidation state of certain metal compounds. Includes in-situ biological treatment such as land farming as well as activated sludge, composting, trickling filters, anaerobic, and aerobic digestion. Includes process equipment and chemicals required for treatment. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).
331XX	11	01	Volume of waste material	MGA (KLI)	<b>ACTIVATED SLUDGE (SEQUENCING BATCH REACTORS)</b> Remedial action. Activated sludge is a sludge that contains living organisms that are agitated and aerated to promote biological growth. Activated sludge treats wastewater containing biodegradable organic compounds. Note that not all activated sludge systems are sequencing batch reactors. Sequencing batch reactors are one of about a dozen variations of activated sludge treatment and do not necessarily have to be aerated. Activated sludge assemblies include reactors, aerators, aerobic bacteria (maintained in suspension), settling tanks, and a recycling line for the settled biomass.
331XX	11	02	Volume of waste material	MGA (KLI)	<b>ROTATING BIOLOGICAL CONTACTORS</b> Remedial action. Rotating biological contactors consist of slowly rotating circular disks of polystyrene, polyvinyl chloride or other stable material which are partly exposed to the air and partly submerged in troughs containing wastewater. The disks are covered with microorganisms that degrade dissolved organic compounds as they rotate in and out of the wastewater.
331XX	11	03	Volume of waste material	CY (M3)	<b>LAND TREATMENT/FARMING (SOLID PHASE BIODEGRADATION)</b> Remedial action. Land treatment/farming is the remedial action technology in which wastes are deposited on or in the soil and naturally degraded by microbes. Degradation can be accomplished by stimulating naturally occurring bacteria in the soil with the addition of nutrients (biostimulation). Another means of accomplishing degradation is by the addition of bacteria to the soil (bioaugmentation) as well as nutrients. The method employed depends on the waste and concentration of naturally occurring bacteria in the soil. After the contaminated soil is excavated and placed on bermed and lined prepared beds or treatment cells, land treatment employs conventional agriculture practices and consists of : 1) placement of soil 2) tillage 3) nutrient application 4) irrigation and 5) land reclamation.
331XX	11	04	Volume of waste material	CY (M3)	<b>IN-SITU BIODEGRADATION/BIORECLAMATION</b> Remedial action. In-situ biodegradation/bioreclamation is the in-place bioremediation of contaminated media. In-situ implies that there is no excavation of soil or extraction of groundwater or surface water.
331XX	11	05	Volume of waste material	MGA (KLI)	<b>TRICKLING FILTERS</b>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					Remedial action. A trickling filtration system uses a rotary sprinkler to evenly distribute a waste liquid across a bed of filtration media, into which microorganisms are attached. As the waste stream trickles through the filter media, the organic contaminants are biodegraded by the microorganisms. Trickling filters consist of a highly permeable bed of media, rotary sprinklers, porous underdrain systems, and settling tanks.
331XX	11	06	Volume of waste material	MGA (KL)	<p><b>BIOLOGICAL LAGOONS</b></p> <p>Remedial action. Biological lagoons use a lined earthen basin and sometimes aeration to promote the optimal growth of microorganisms for the effective remediation of contaminated liquids and sludges. This method of treatment relies on algal photosynthesis, adequate mixing, good inlet-outlet design and adequate air temperatures to operate efficiently. Facultative lagoons typically are used to treat low to medium strength organic wastes. Anaerobic lagoons and/or aerated lagoons are modified processes that treat wastes at higher rates.</p>
331XX	11	07	Volume of waste material	CY (M3)	<p><b>COMPOSTING</b></p> <p>Remedial action. Composting is a process which biologically degrades soil contaminants, sludge, or municipal solid organic wastes. The contaminated media is mixed with organic nutrients. A bulking agent, such as wood chips, and inorganic nutrients are also mixed in. The mixture is then placed in (compost) piles to promote heat generation and, thus, faster and more efficient biodegradation. Composting systems can be simple windrows mixed or turned periodically or have complete mechanical mixing and aeration systems.</p>
331XX	11	08	Volume of waste material	CY (M3)	<p><b>SLUDGE STABILIZATION - AEROBIC</b></p> <p>Remedial action. Aerobic sludge stabilization is the bioremediation treatment process in which bioremedial microorganisms use oxygen to biologically oxidize compounds. Assemblies for aerobic sludge stabilization include tanks, lagoons, air diffusers, aeration equipment, and pure oxygen systems.</p>
331XX	11	09	Volume of waste material	CY (M3)	<p><b>SLUDGE STABILIZATION - ANAEROBIC</b></p> <p>Remedial action. Anoxic sludge stabilization is the bioremediation treatment process in which bioremedial microorganisms do not require oxygen and exist and react in a relatively oxygen-free environment. Assemblies for anoxic sludge stabilization include air-tight containers, pH monitors, lime, and methane recovery systems.</p>
331XX	11	10	Volume of waste material	CY (M3)	<p><b>GENETICALLY ENGINEERED ORGANISMS (WHITE ROT FUNGUS)</b></p> <p>Remedial action. Genetically engineered organisms refers to microorganisms that have undergone external processes by which its basic set of genes has been altered. The utilization of genetically engineered organisms involves the</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	11	11	Volume of waste material	CY (M3)	controlled use of these specially cultivated organisms to treat contaminants.
331XX	11	12	Surface area of waste material	SF (M2)	<p><b>BIOVENTING</b>            Remedial action. A process for aerating subsurface soils, using injected air as the oxygen source, to stimulate in-situ biological activity and promote biodegradation of compounds amenable to biodegradation under aerobic conditions. In contrast to soil vapor extraction, bioventing is designed to maximize in-situ biodegradation, rather than volatilization of amenable compounds. Thus, bioventing systems usually operate at much lower per well air flow rates than soil vapor extraction systems. Equipment required for bioventing includes wells, manifold piping, and blower(s).</p>
331XX	11	13	Surface area of waste material	SF (M2)	<p><b>BIOSLURPING</b>            Remedial action. A process for recovering free phase light non-aqueous phase liquids (LNAPL) and/or contaminated groundwater from near the vadose zone/water-table interface via vacuum enhanced pumping; often accomplished with a variable length suction pipe (for extracting liquids) inside of a soil vapor extraction well. The screened interval of the soil vapor extraction well usually spans the vadose zone/water-table interface. Soil vapor extraction and free product/groundwater extraction occur simultaneously, resulting in aeration of surrounding soil which enhances biodegradation compounds amenable to biodegradation under aerobic conditions. Equipment required for bioslurping includes wells, manifold piping, suction piping (or drop tubes), vacuum pump(s) (often liquid-ring pumps), air/water separator(s), and oil/water separator(s). Extracted liquids and air may require treatment.</p>
331XX	11	14	Volume of waste material	CY (M3)	<p><b>BIOPILE (HEAP REMEDIATION)</b>            Remedial action. Biopile is a process for degrading and/or detoxifying contaminants by use of an ex-situ version of soil bioventing in which air is pulled or blown through the soil pile to stimulate indigenous hydrocarbon-degrading microorganisms. Required equipment includes piping, blower(s), liner, and knockout tanks.</p>
331XX	11	50	Each facility	EA (EA)	<p><b>CONSTRUCTION OF PERMANENT PLANT FACILITY</b>            New remedial action construction of a permanent plant facility to remediate wastes through any of the technology subsystems listed above (331XX.11). Add a note for this item to explain which of the above subsystem technologies are used in the plant and note the rated capacity of the plant such as</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	11	9x			MGA/DAY (KLI/DAY), CY/DAY (M3/DAY), etc.
331XX	12				<p><b>OTHER (Use Numbers 90-99)</b> Includes all biological treatments during remedial action not described by the above listed subsystems.</p>
331XX	12				<p><b>CHEMICAL TREATMENT</b> Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.12.(01.-14.).) Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.12.50.). Chemical treatment is the process in which hazardous wastes are chemically changed to remove toxic contaminants from the environment. Type of treatment included in this system are oxidation/reduction, solvent extraction, chlorination, ozonation, ion exchange, neutralization, hydrolysis, photolysis, dechlorination, and electrolysis reactions. Includes process equipment and chemicals required for treatment. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).</p>
331XX	12	01	Volume of waste material	MGA (KLI)	<p><b>OXIDATION/REDUCTION (CATALYTIC OXIDATION, UV OZONE, PEROXIDE, SOLAR DETOXIFICATION)</b> Remedial action. Oxidation/reduction (redox) reactions are those in which an atom or group of atoms loses electrons, hence oxidation/reduction is the transfer of electrons. In oxidation/reduction reactions the contaminant is usually oxidized. The addition of oxygen breaks down organic waste or chemicals such as cyanides, phenols and organic sulfur compounds. Peroxide and ozone are the oxidizing agents usually used in conjunction with UV. For ozonation use "Ozonation" (331XX.12.04).</p>
331XX	12	02	Volume of waste material	MGA (KLI)	<b>SOLVENT EXTRACTION</b> Remedial action. Separation processes in which two immiscible or partially soluble liquid phases are brought into contact for the transfer of one or more compounds are referred to as liquid-liquid extraction or, more loosely, as solvent extraction. The processes taking place are primarily physical, since the solutes being transferred are ordinarily recovered without chemical change. On the other hand, the physical equilibrium relationships on which such operations are based depend mainly on the chemical characteristics of the solutes and solvents. Thus, use of a solvent that chemically resembles one component of a mixture more than the other components will lead to concentration of that component in the solvent phase, with the exclusion from

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					the phase of the dissimilar components. The contaminant is not altered by extraction but is transferred to a different phase. The most common systems include 1) mixer-settler, consisting of a mixing chamber and a settling chamber for phased dispersion and separation, 2) extraction columns, consisting of either packed extractors or sieve-tray extractors for mixing of the solute and solvent, and 3) centrifugal contactors, which rely on centrifugal force to mix the solute and solvent. Refer to "Soil Washing" (331XX.13.09) for ex-situ extraction of contaminants from soils or "Soil Flushing" (331XX.13.10) for in-situ extraction of contaminants from soils.
331XX	12	03	Volume of waste material	MGA (KLI)	<b>CHLORINATION</b> Remedial action. Chlorination is the application of chlorine to drinking water, sewage or industrial wastes to disinfect or to oxidize undesirable compounds. Assemblies include feed systems, storage tanks, chemicals, piping, and diaphragm metering pumps.
331XX	12	04	Volume of waste material	MGA (KLI)	<b>OZONATION</b> Remedial action. Ozone induced oxidation is a water or wastewater treatment process involving the use of ozone as an oxidizing agent. Ozone is produced with corona discharge technology, and must be produced on site due to the hazards of transporting and storing ozone. Ozone induced oxidation can be conducted in a batch or continuous process. Batch production uses a single reaction tank, while continuous operation uses two separate tanks, one being an overflow tank for excess ozone. Note that electricity (high amounts are used) should be included. Assemblies include post treatment to remove any residual ozone, and monitoring units. Oxidation can be increased by supplying ultraviolet (UV) radiation during treatment.
331XX	12	05	Volume of waste material	MGA (KLI)	<b>ION EXCHANGE</b> Remedial action. Ion exchange is the process by which inorganic compounds are removed by the capture of ions on a resinous material known as ion exchange resins. The resin is contained in a column and the wastewater is continuously passed through the column until the resin becomes exhausted, and is then regenerated. Ion exchange is not a destructive technology and the contaminated regenerant will eventually need disposal. Exchangers include cation exchangers, anion exchangers, and mixed-bed exchangers. Assemblies include ion exchange columns, chemical feed pumps, and storage tanks.
331XX	12	06	Volume of waste material	MGA (KLI)	<b>NEUTRALIZATION</b> Remedial action. Neutralization is the adjustment of a wastewater stream pH by the use of acids and caustics. Neutralization includes acids, caustics, chemical storage, mixing basins, pH probes and controls.

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	12	07	Volume of waste material	MGA (KLI)	<b>CHEMICAL HYDROLYSIS</b> Remedial action. Hydrolysis is the chemical reaction of water with another substance in which hydrogen (H) and hydroxyl (OH) are added to the other substance usually forming two or more new compounds. Assemblies include feed systems, storage tanks, piping, and diaphragm metering pumps.
331XX	12	08	Volume of waste material	MGA (KLI)	<b>ULTRAVIOLET PHOTOLYSIS</b> Remedial action. Ultraviolet photolysis is the process by which chemical bonds are broken under the influence of ultraviolet light. Products of photo-degradation vary according to the matrix in which the process occurs, but the complete conversion of an organic contaminant to CO <sub>2</sub> , H <sub>2</sub> O, etc., is not probable. Equipment includes UV lamps, process pumps and monitors. Note that this account does not include UV oxidation. See "Oxidation/Reduction (Catalytic Oxidation...)" (331XX.12.01).
331XX	12	09	Volume of waste material	CY (M3)	<b>DEHALOGENATION (CATALYTIC DECHLORINATION)</b> Remedial action. Dehalogenation is the chemical process in which halogenated (usually chlorinated) organic compounds in an aqueous or soil media are mixed and heated with basic reagent to remove the halogens (usually chlorine). Included in this subsystem are all dehalogenation processes that are not based on alkali metals. See "Alkali Metal Dehalogenation" (331XX.12.10).
331XX	12	10	Volume of waste material	CY (M3)	<b>ALKALI METAL DECHLORINATION</b> Remedial action. Alkali metal dechlorination is the reaction of an alkali metal with a glycol for the removal of the halogens from halogenated organics such as fluorine, chlorine, bromine, and iodine. The alkali metal dechlorination process treats contaminated soils and sludges by using an alkaline metal mixed with a reagent to form a slurry, which is transferred to a concentrator reactor where the filtered waste is dechlorinated. The excess reagent is decanted and the soil is washed with water. The process requires dewatering pretreatment. This subsystem includes all generic alkali metal dehalogenation processes not specifically identified in other subsystems. See "Alkali Metal /Polyethylene Glycol (A/PEG)" (331XX.12.11).
331XX	12	11	Volume of waste material	CY (M3)	<b>ALKALI METAL/POLYETHYLENE GLYCOL (A/PEG)</b> Remedial action. APEG (and KPEG) are batch processes which detoxify halogenated aromatic and other organic compounds such as PCBs or pentachlorophenols (PCPs) by heating them with polyethylene glycol (PEG) and sodium hydroxide (NaPEG) or potassium hydroxide (KPEG) for several hours at 300 degrees F. The APEG process decomposes PCBs and representative halogens in an exothermic and self-sustaining manner. A

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					dechlorination reagent is formed by reacting alkali metals (such as sodium) with the polyethylene glycol in the presence of heat and oxygen. The reaction mechanism involves nucleophilic substitution/elimination and the oxidative degradation of chlorine through the generation of numerous free radicals. The process reactivity can be "tuned" or directed at various aliphatic or aromatic systems by varying the molecular weight of the polyethylene glycol. Typical by-products of the reaction are salts such as sodium chloride, hydrogen and hydroxylated organic derivatives. The primary advantage of the system is that the reagent is not based on a dispersed metallic sodium reaction, can tolerate low levels of water content and is stable in air. Therefore, the process maybe applicable to soils, dredgings, sediments and low moisture sludges.
331XX	12	12	Volume of waste material	CY (M3)	<b>BASE-CATALYZED DECOMPOSITION PROCESS (BCDP)</b> Remedial action. The base-catalyzed decomposition process (BCDP) is a chemical dehalogenation treatment which is designed to dehalogenate (usually chlorinated) aromatic contaminants such as PCBs in sediment, oil, soil and sludge. For soil and sediment, the process uses two reactors. In the first reactor, the soil is mixed with sodium bicarbonate and heated at about 350 degrees C for one hour. 25%-75% of the halogenated aromatics are dehalogenated in this step. The rest are volatilized and passed on to the second reactor, a slurry or liquid phase reactor which utilizes a high boiling-point hydrocarbon oil, catalyst, sodium hydroxide and heat (350 degrees C) to dehalogenate/decompose the contaminants. Contaminated oily liquids (such as pesticides and PCB transformer oil) are treated with the slurry/liquid phase reactor only.
331XX	12	13	Volume of waste material	MGA (KLI)	<b>ELECTROLYSIS</b> Remedial action. Electrolysis (in-situ or ex-situ) is the process in which reduction and oxidation reactions take place at the surface of conductive electrodes immersed in an electrolyte, under the influence of an applied potential. Electrolysis oxidizes the substances at the anode and reduces the substances at the cathode. Assemblies include trough-shaped elongated cells, monitoring equipment, anode and cathode material.
331XX	12	14	Volume of waste material	CF (M3)	<b>VAPOR RECOVERY/REUSE (Internal Combustion Engine)</b> Remedial action. Organic vapors may be suitable as the primary fuel for operation of internal combustion engines. Supplemental fuels are generally used to blend or supplant the contaminated vapors during periods of low production.
331XX	12	50	Each facility	EA (EA)	<b>CONSTRUCTION OF PERMANENT PLANT FACILITY</b> New remedial action construction of a permanent plant facility to remediate wastes through any of the technology subsystems listed above (331XX.12).

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					Add a note for this item to explain which of the above subsystem technologies are used in the plant and note the rated capacity of the plant such as MGA/DAY (KLI/DAY), CY/DAY (M3/DAY), etc.
331XX	12	9x			<b>OTHER (Use Numbers 90-99)</b> Includes all biological treatments during remedial action not described by the above listed subsystems.
331XX	13				<b>PHYSICAL TREATMENT</b> Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.13.(01.-32.)). Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.13.50.). These treatment processes are the physical separation of contaminants from solid, liquid or gaseous waste streams. The treatments are applicable to a broad range of contaminant concentrations. Physical treatments generally do not result in total destruction or separation of the contaminants in the waste stream, consequently post-treatment is often required. Type of physical treatment included in this system are filtration, sedimentation, flocculation, precipitation, equalization, evaporation, stripping, soil washing, and carbon adsorption. Includes process equipment and chemicals required for treatment. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).
331XX	13	01	Volume of waste material	MGA (KLI)	<b>FILTRATION/ULTRAFILTRATION</b> Remedial action. Filtration is the physical process whereby particles suspended in a fluid are separated by forcing the fluid through a porous medium. As the fluid passes through the medium, the suspended particles are trapped on the surface of the medium and/or within the body of the medium. The pressure differential to move the fluid through the medium can be induced by gravity, positive pressure, or vacuum. Ultrafiltration occurs when particles are separated by forcing the fluid through a semi-permeable membrane.
331XX	13	02	Volume of waste material	MGA (KLI)	<b>SEDIMENTATION</b> Remedial action. Sedimentation is the physical process by which particles suspended in a liquid are made to settle by means of gravitational and inertial forces acting on both the particles suspended in the liquid and the liquid itself.
331XX	13	03	Volume of waste material	MGA (KLI)	<b>STRAINING</b> Remedial action. Straining is the process by which wastewater is sent through a strainer to remove sludge and coarse solid materials. Assemblies include

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					associated pumps, piping, and valves, storage tanks, and backwashing contaminated membranes.
331XX	13	04	Volume of waste material	MGA (KLI)	<b>COAGULATION/FLOCULATION/PRECIPITATION</b> Remedial action. Coagulation is the increased clumping of particles in wastewater by biological or chemical means allowing for the separation of the particles from the water by sedimentation or filtration. It is often induced by chemicals such as lime, alum and iron salts.
331XX	13	05	Volume of waste material	MGA (KLI)	<b>EQUALIZATION</b> Remedial action. Equalization is the process in which collected wastewater is mixed to produce a homogenous solution and is discharged to a treatment plant. Blending is used to even out variations in contaminated soils and sludges, similar to equalization. Assemblies include mixers, aerators, discharging pumps and equalization tank.
331XX	13	06	Volume of waste material	MGA (KLI)	<b>EVAPORATION</b> Remedial action. Evaporation treats organic material that can be removed by heat. This is usually conducted under vacuum conditions increasing surface area to further promote separation. Assemblies include simple stills, flash and circulation evaporators, rotors, and heating.
331XX	13	07	Volume of waste material	MGA (KLI)	<b>AIR STRIPPING</b> Remedial action. Air stripping is the physical transfer of dissolved molecules from a liquid waste stream to a flowing gas. It is normally carried out as a continuous operation that employs a packed tower. For air stripping, liquid waste is pumped near the top of stripping column and flows downward through the tower, concurrent to an upward air flow. As the air flow contacts the liquid wastes, the volatile organics are stripped from the liquid waste.
331XX	13	08	Volume of waste material	MGA (KLI)	<b>STEAM STRIPPING</b> Remedial action. Steam stripping is the physical transfer of dissolved molecules from a liquid waste stream to a vapor stream. It is normally carried out as a continuous operation that employs a conventional fractional distillation column. For steam stripping, preheated wastewater is pumped near the top of the distillation column and flows downward, concurrent to an upward flow of steam rising from the column bottom. As the steam contacts the liquid wastes, the volatile organics are stripped from the liquid waste and carried to a condenser in a water-cooled heat exchanger and collected in an accumulator tank.
331XX	13	09	Volume of waste material	CY (M3)	<b>SOIL WASHING (SURFACTANT/SOLVENT)</b> Remedial action. Soil washing is an ex-situ separation technology which uses a fluid (usually water or water with wash improving additives) to remove

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					hazardous, toxic, or radioactive contaminants from excavated soils, sludges and sediments. The soil is rinsed to remove any excess surfactants, while the liquids are treated as contaminated liquids. Assemblies include conveyors, screens, tanks, dewatering devices, associated piping and valves, and liquid waste treatment units. Refer to "Dehalogenation (Catalytic Dechlorination)" (331XX.12.09), "Alkali Metal Dechlorination" (331XX.12.10), "Solvent Extraction" (331XX.12.02) (which uses an organic chemical to dissolve, separate and concentrate organic contaminants) and "Soil Flushing (Surfactant/Solvent)" (331XX.13.10) for in-situ treatment.
331XX	13	10	Volume of waste material	CY (M3)	<b>SOIL FLUSHING (SURFACTANT/SOLVENT)</b> Remedial action. Soil flushing is an in-situ treatment of soils, sludges and sediments with water (with or without additives) to remove hazardous, toxic or radioactive contaminants. The wastewater is then recovered and treated. Assemblies include infiltration basins, water storage tanks with associated pumps, valves, and piping, groundwater recovery wells, and treatment for the recovered water. See 'Soil Washing (Surfactant/solvent)' (331XX.13.09) for ex-situ treatment.
331XX	13	11	Volume of waste material	CY (M3)	<b>SOLIDS DEWATERING</b> Remedial action. Solids dewatering is the process of the removal of water by filtration, centrifugation, open air drying, or other mechanical or evaporative methods. Dewatering sludge facilitates disposal by burning or landfilling. Does not include dewatering through the use of a filter press, see "Filter Presses" (331XX.13.30).
331XX	13	12	Volume of waste material	MGA (KLI)	<b>OIL/WATER SEPARATION</b> Remedial action. Oil/water separation is the process of separating oil and water due to density differences and gravitational pull.
331XX	13	13	Volume of waste material	MGA (KLI)	<b>DISSOLVED AIR FLOTATION</b> Remedial action. Dissolved air floatation (DAF) is commonly used as a pretreatment process for the separation of suspended solids, oil, and grease from wastewater without the use of chemicals. Gas bubbles are brought out of solution and into contact with contaminants in the waste stream. These gas bubbles attach to the contaminants and lift them to the surface. Assemblies include pressurization units, discharge heads, and tanks.
331XX	13	14	Volume of waste material	CY (M3)	<b>HEAVY MEDIA SEPARATION</b> Remedial action. Heavy media separation is the physical process used to separate materials of differing density by float/sink in a colloidal suspension of a finely ground dense mineral. This suspension, or media, usually consists of a water-suspension of magnetite, galena or ferrosilicon.

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	13	15	Volume of waste material	MGA (KLI)	<p><b>DISTILLATION</b></p> <p>Remedial action. Distillation is the process of purifying liquids through boiling, so that the steam condenses to a pure liquid and the pollutants remain in a concentrated residue. It involves two basic phases, the liquid phase and the vapor phase. The components which are to be separated by distillation are present in both phases but in different concentrations. If there are only two components in the liquid, one concentrates in the condensed vapor (condensate) and the other in the residual liquid. If there are more than two components, the less volatile components concentrate in the residual liquid and the more volatile in the vapor condensate.</p>
331XX	13	16	Volume of waste material	MGA (KLI)	<p><b>CHELATION</b></p> <p>Remedial action. Chelation is the process in which toxic metals are removed from the soil. Metals contained in the soil are contacted with an aqueous solution containing a chelating agent. The resulting slurry is dewatered and the chelating agent combined with the toxic metal is sent to a storage or treatment plant. Assemblies include conveyors, water storage tanks, dewatering devices, and associated piping and valves.</p>
331XX	13	17	Volume of waste material	MGA (KLI)	<p><b>SOLVENT EXTRACTION</b></p> <p>Remedial action. Refer to "Solvent Extraction" (331XX.12.02) for liquid-liquid extraction. Refer to "Soil Washing (Surfactant/Solvent)" (331XX.13.09) for ex-situ extraction of contaminants from soils. Refer to "Soil Flushing (Surfactant/Solvent)" (331XX.13.10) for in-situ extraction of contaminants from soils. Refer to "Dehalogenation (Catalytic Dechlorination)" (331XX.12.09) of contaminated soils and sludges, "Alkali Metal Dechlorination" (331XX.12.10) and "Alkali Metal/Polyethylene Glycol (A/PEG)" (331XX.12.11) for related processes.</p>
331XX	13	18	Volume of waste material	MGA (KLI)	<p><b>SUPERCRITICAL EXTRACTION</b></p> <p>Remedial action. Supercritical extraction is the process in which the organic constituents of a waste stream are dissolved after mixing with a gas (such as carbon dioxide, propane, or butane) pressurized to the supercritical state. The enhanced solubilities of the fluid, due to the high pressures and temperatures, aid in the removal of the wastes.</p>
331XX	13	19	Volume of waste material	CF (M3)	<p><b>CARBON ADSORPTION - GASES</b></p> <p>Remedial action. Vessels containing activated carbon are used to remove organic contaminants from gaseous waste streams. Organic molecules are adsorbed into the carbon, which is either replaced or regenerated. Items associated with carbon adsorption are granular activated carbon columns, prefilters, and items associated with regenerating the spent carbon. Organic carbon analyzers are used for on-line control.</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	13	20	Volume of waste material	MGA (KLI)	<b>CARBON ADSORPTION - LIQUIDS</b> Remedial action. Carbon adsorption use activated carbon to remove organic contaminants from liquid waste streams. Granular activated carbon is applied in a stationary column or filter bed, where organic contaminants are adsorbed. Items associated with carbon adsorption are isotherm tests, granular activated carbon columns, prefilters, and items associated with regenerating the spent carbon.
331XX	13	21	Volume of waste material	MGA (KLI)	<b>MEMBRANE SEPARATION - REVERSE OSMOSIS</b> Remedial action. Membrane separation removes dissolved salts, soluble silica, colloids and organic molecules from waste streams. Wastewater is collected and sent through a reverse osmosis system under pressure. The reverse osmosis systems filters, then concentrates waste materials while water easily passes through. Equipment includes reverse osmosis modules, chemical feed (usually acid), high pressure pumps, and treatment and disposal of the concentrate.
331XX	13	22	Volume of waste material	MGA (KLI)	<b>MEMBRANE SEPARATION - ELECTRODIALYSIS</b> Remedial action. Electrodialysis is the process in which an electrically charged membrane is introduced into a waste stream where the voltage drives the charged ions towards the membrane. Electrodialysis removes dissolved salts, soluble silica and organic materials from waste streams and concentrates the dissolved heavy metals. Assemblies include water storage tanks, associated pumps, piping, and valves, and backwashing of contaminated membranes.
331XX	13	23	Volume of waste material	CY (M3)	<b>SOIL VAPOR EXTRACTION</b> Remedial action. Soil vapor extraction (SVE), also known as vapor extraction, is a remediation technology which removes volatile organic compounds from soil by pulling air through the soil. The air is moved by means of a blower or vacuum pump connected to wells or trenches via piping. Associated equipment includes condensate handling devices, instrumentation and controls, and, in most cases, offgas treatment. The SVE process is distinct from vapor/gas venting and collection listed under "Gas/Vapor Collection Trench System" (331XX.07.01). Activities associated with SVE may include surface covering (placement of geomembranes) and air sparging (331XX.13.32.).
331XX	13	24	Volume of waste material	CY (M3)	<b>SHREDDING</b> Remedial action. Shredding is used to break up large solid wastes and process drums and their contents. Necessary equipment includes conveyors and rotary shear shredders.
331XX	13	25	Volume of waste material	CY (M3)	<b>AERATION</b>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					Remedial action. Aeration is the process of bringing about contact between air and water for the purpose of promoting biological degradation. Aeration is employed in several biological technologies including activated sludge, rotating biological contactors, trickling filters and biological lagoons. Assemblies include tanks, air diffusers, and reactors.
331XX	13	26	Volume of waste material	CY (M3)	<b>ADVANCED ELECTRICAL REACTOR</b> Remedial action. The advanced electrical reactor employs a thermal destruction process in which wastes are incinerated within a reactor core that is heated by electrically heated carbon electrodes (which are insulated by nitrogen gas). Included are reactor ownership/rental, feeders for solids and nozzles for liquids, and post reactor treatment.
331XX	13	27	Volume of waste material	CY (M3)	<b>LOW LEVEL WASTE (LLW) COMPACTION</b> Remedial action. Compacting is used for densifying the volume of LLW (radioactive) waste prior to disposal. Necessary equipment includes compactors, conveyors and compactor/shredder units and applicable ventilation systems. Also included are ownership/rental, setup and testing. This does not include waste transportation or disposal.
331XX	13	28	Volume of waste material	CY (M3)	<b>AGGLOMERATION</b> Remedial action. Agglomeration is the transformation of sludge into dry, dense pellets. Agglomeration is accomplished by batchmixing sludge with an agglomeration agent.
331XX	13	29	Volume of waste material	MGA (KLI)	<b>IN-SITU STEAM EXTRACTION</b> Remedial action. In-situ steam extraction is the removal of hydrocarbons from contaminated soils by the continuous pumping of steam and heated compressed air and recovery of the subsequent contaminated water and offgases which are cooled to condense water and organics. The resultant air-stream is then treated (by carbon adsorption, catalytic oxidation, etc.), compressed and returned to the soil being treated. The condensed water is removed from the liquid stream with a gravity separator followed by treatment to remove dissolved organics. The condensed organics are collected and held for recycling or disposal. Assemblies include drilling injection and extraction wells and vacuum pumps.
331XX	13	30	Volume of waste material	MGA (KLI)	<b>FILTER PRESSES</b> Remedial action. Filter presses are used for sludge dewatering. Filter presses consist of a number of chamber filter plates which sludge is pumped between. Under high pressure, the plates are forced together which effectively deters the sludge. The resulting sludge cake is then discharged from the press. Assemblies include filter press ownership/rental costs, operating costs, sludge

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					transfer and feed pumps, chemical feed and storage equipment, sludge storage and conditioning tanks, mixers, belt filter, vacuum filter, drying beds, and necessary pipework.
331XX	13	31	Volume of waste material	CY (M3)	<b>LIGNIN ADSORPTION/SORPTIVE CLAYS</b> Remedial action. Lignin adsorption/sorptive clays are used to treat aqueous waste streams with organic, inorganic and heavy metals contamination. The waste stream is treated due to the molecular adhesion of the contaminants to an adsorptive surface.
331XX	13	32	Volume of waste material	MGA (KLI)	<b>AIR SPARGING</b> Remedial action. Air sparging is a ground water remediation technology which removes organic contaminants by injecting air into the aquifer and allowing the air to pass upward into the unsaturated soil. Contaminants are removed either through partitioning into the moving air or through biodegradation enhanced by the introduction of dissolved oxygen from the injected air. The injected air is almost always meant to be captured by an SVE system. Air sparging equipment consists of an air compressor (usually an oil-less compressor), piping, and injection wells. Associated equipment includes instrumentation and controls, and occasionally involves air filters and a heat exchanger.
331XX	13	50	Each facility	EA (EA)	<b>CONSTRUCTION OF PERMANENT PLANT FACILITY</b> New remedial action construction of a permanent plant facility to remediate wastes through any of the technology subsystems listed above (331XX.13). Add a note for this item to explain which of the above subsystem technologies are used in the plant and note the rated capacity of the plant such as MGA/DAY (KLI/DAY), CY/DAY (M3/DAY), etc.
331XX	13	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all physical treatments during remedial action not described by the above listed subsystems.
331XX	14				<b>THERMAL TREATMENT</b> Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.14.(01.-07.)). Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.14.50.). Thermal treatment is the destruction of wastes through exposure to high temperature in combustion chambers and energy recovery devices. Several processes capable of incinerating a wide range of liquid and solid wastes include fluidized bed, rotary kiln, multiple hearth, infrared,

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					circulating bed, liquid injection, pyrolysis, plasma torch, wet air oxidation, supercritical water oxidation, molten salt destruction, and solar detoxification. Includes process equipment and chemicals required for treatment. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).
331XX	14	01	Volume of waste material	CY (M3)	<p><b>INCINERATION</b>            Remedial action. Includes fluidized bed, rotary kiln, multiple hearth, infrared, circulating bed, liquid injection, pyrolysis, plasma torch, wet air oxidation, batch, etc. Incineration is the thermal destruction of wastes through burning in combustion chambers and energy recovery devices. Incineration is accomplished by oxidative or pyrolytic methods. Auxiliary equipment includes shredders, conveyors, blowers, fuel system, instrumentation and controls, bag houses, scrubbers, and treated material handling systems.</p>
331XX	14	02	Volume of waste material	CY (M3)	<p><b>LOW TEMPERATURE THERMAL DESORPTION</b>            Remedial action. Includes fluidized bed, rotary kiln, multiple hearth, infrared, circulating bed, liquid injection, pyrolysis, plasma torch, wet air oxidation, batch, etc. Low temperature thermal desorption (also called Low Temperature Volatilization) heats (directly or indirectly) contaminated media such as soil, sediments, sludges and filter cakes between 200 - 1000 degrees F, driving off water and volatile contaminants. The volatile contaminants may be burned in an afterburner, condensed to reduce the volume to be disposed of, oxidized through catalytic oxidation or captured by carbon adsorption beds. Auxiliary equipment includes shredders, conveyors, blowers, fuel system, instrumentation and controls, bag houses, scrubbers, and treated material handling systems.</p>
331XX	14	03	Volume of waste material	MGA (KLI)	<p><b>SUPERCRITICAL WATER OXIDATION</b>            Remedial action. Supercritical water oxidation decontaminates wastewater by heating it above the critical point of water and adding an oxidant such as air, oxygen, or hydrogen peroxide to oxidize the organic contaminants to mainly carbon dioxide and water. Resultant gases such as CO<sub>2</sub>, N<sub>2</sub>, and NO<sub>x</sub> (from nitrogen compounds) are removed as the effluent is cooled and depressurized. Halogenated compounds produce the corresponding halogen acids and sulfur-containing compounds produce sulfuric acid.</p>
331XX	14	04	Volume of waste material	CY (M3)	<p><b>MOLTEN SALT DESTRUCTION</b>            Remedial action. Molten salt destruction is the combustion of waste materials in a bed of molten salt. Wastes are fed into a vessel containing the molten salt and air in which the high rate of heat transfer to the wastes causes destruction. Melt removal can be continuous or in batch mode. A variety of salts are used, with the most common being sodium carbonate and potassium carbonate.</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					Assemblies for molten salt destruction include salts, incinerators, storage systems, filtration systems, dewatering pretreatment systems, plus a secondary reactor and cleanup system for offgases.
331XX	14	05	Volume of waste material	CY (M3)	<p><b>RADIO FREQUENCY HEATING</b></p> <p>Remedial action. Radio frequency heating includes heating soil with radio frequency waves to thermally decompose, vaporize, and distill hazardous constituents. Vapors emitted from the soil are collected in a vapor barrier above the soil surface for treatment or incineration.</p>
331XX	14	06	Volume of waste material	CY (M3)	<p><b>SOLAR DETOXIFICATION</b></p> <p>Remedial action. Solar detoxification photolytically degrades vaporized soil contaminants in a solar reactor into which sunlight is focused from a parabolic mirror array. The vaporized contaminants flow into the reactor after being desorbed from the soil when the latter is heated to about 750 degrees F.</p>
331XX	14	07	Volume of waste material	CY (M3)	<p><b>HIGH TEMPERATURE THERMAL DESORPTION</b></p> <p>Remedial action. High temperature thermal desorption unit &gt;340 deg C (&gt;650 deg F) is suitable for treatment of material contaminated by organic compounds that are classified as semivolatile. Oxygen levels may be limited or reduced to prevent combustion in the primary chamber.</p>
331XX	14	50	Each facility	EA (EA)	<p><b>CONSTRUCTION OF PERMANENT PLANT FACILITY</b></p> <p>New remedial action construction of a permanent plant facility to remediate wastes through any of the technology subsystems listed above (331XX.14). Add a note for this item to explain which of the above subsystem technologies are used in the plant and and note the rated capacity of the plant such as MGA/DAY (KLIDAY), CY/DAY (M3/DAY), etc.</p>
331XX	14	9X			<p><b>OTHER (Use Numbers 90-99)</b></p> <p>Includes all thermal treatment during remedial action not described by the above listed subsystems.</p>
331XX	15				<p><b>STABILIZATION/FIXATION/ENCAPSULATION</b></p> <p>Includes operation (separate items for each subsystem technology) of the plant facility during the remedial action phase, based on the volume of waste material treated, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.15.(01.-07.).)</p> <p>Includes a separate item for the construction of a permanent plant facility, including permanent treatment equipment which is purchased for one project only (331XX.15.50.). Stabilization/fixation/encapsulation processes attempt to improve the handling and physical characteristics of the wastes, decrease the surface area, limit the solubility of any pollutants and detoxify contained pollutants. For transportation see "Transport to Treatment Plant"</p>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	15	01	Volume of waste material	CY (M3)	<b>MOLTEN GLASS</b> Remedial action. Molten glass is used in destroying combustible hazardous organic wastes and/or encapsulating the solid byproducts. During the process a pool of molten glass is developed and maintained by a high amount of electrical current passing between submerged electrodes. Combustible gases are mixed with air, ignite and react above the pool of molten glass. Solids and noncombustible materials are incorporated into the glass bed, while gases are pulled out of the chamber through a series of filters. Assemblies include pretreatment systems (evaporation and sedimentation), conveyors, sumps used to collect settling particles, heat recovery and air pollution control systems. Does not include the excavation and transport of contaminated material, see "Solids Collection and Containment" (331XX.08) and "Liquids/Sediments/Sludges Collection and Containment" (331XX.09).
331XX	15	02	Volume of waste material	CY (M3)	<b>IN-SITU VITRIFICATION</b> Remedial action. In-situ vitrification is the in-place encapsulation of contaminated soils and sludges into a solid glassy matrix by melting the soil using large amounts of electrical current. Assemblies include electrical generators, electrical power distribution, electrodes, graphite placed over the soil to establish a conductive path and exhaust hood system to capture gaseous wastes.
331XX	15	03	Volume of waste material	CY (M3)	<b>IN-SITU POZZOLAN PROCESS (LIME/PORTLAND CEMENT)</b> Remedial action. In-situ Pozzolan Process is the in-place encapsulation of waste material by combining pozzolanic (siliceous) material, lime, or portland cement with water to form a concrete-like solid and left in place, encapsulating the waste. Pozzolanic material includes fly ash, blast-furnace slag and cement kiln dust.
331XX	15	04	Volume of waste material	CY (M3)	<b>POZZOLAN PROCESS (LIME/PORTLAND CEMENT)</b> Remedial action. Pozzolanic (siliceous) material, lime, or portland cement, and water are mixed to form a concrete-like solid matrix in which the waste is encapsulated. Batchmixers or pugmills are routinely used for the mixing of waste material, pozzolanic material and water. Pozzolanic material includes fly ash, ground blast-furnace slag, and cement kiln dust. Does not include the excavation and transport of contaminated material, see "Solids Collection and Containment" (331XX.08) and "Liquids/Sediments/Sludges Collection and Containment" (331XX.09).
331XX	15	05	Volume of waste material	CY (M3)	<b>ASPHALT-BASED ENCAPSULATION</b> Remedial action. Asphalt-based encapsulation uses asphalt to form a matrix

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					encapsulating contaminated liquid or solid wastes. The process entails mixing waste and asphalt together, placement in a mold, and heating until they fused together in a stable matrix. Asphalt-based encapsulation include dewatering, organic polymers, lime, kiln dust, or portland cement.
331XX	15	06	Volume of waste material	CY (M3)	<b>RADIOACTIVE WASTE SOLIDIFICATION (GROUTING/OTHER)</b> Remedial action. Radioactive waste solidification additives are used to form a uniform and stable matrix to encapsulate radioactive waste materials. Assemblies include pumps for liquids or slurries, conveyors for sludges or solids, storage silos, weigh feeders, piping, mixers and disposal or storage.
331XX	15	07	Volume of waste material	CY (M3)	<b>SLUDGE STABILIZATION (AGGREGATE/ROCK/SLAG)</b> Remedial action. Sludge stabilization is the solidification of contaminated wastes using aggregate, rock and slag additives to form a uniform and stable matrix to encapsulate waste materials. Sludge stabilization include pumps for liquids or slurries, conveyors for sludges or solids, storage silos, weigh feeders, piping, mixers and disposal or storage.
331XX	15	50	Each facility	EA (EA)	<b>CONSTRUCTION OF PERMANENT PLANT FACILITY</b> New remedial action construction of a permanent plant facility to remediate wastes through any of the technology subsystems listed above (331XX.15). Add a note for this item to explain which of the above subsystem technologies are used in the plant and note the rated capacity of the plant such as MGA/DAY (KL/DAY), CY/DAY (M3/DAY), etc.
331XX	15	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all stabilization/fixation/encapsulation treatments during remedial action not described by the above listed subsystems.
331XX	17				<b>DECONTAMINATION AND DECOMMISSIONING (D&amp;D)</b> Decontamination and decommissioning during remedial action are all activities associated with shutdown and final cleanup of a nuclear or other facility. Includes facility shutdown and dismantling activities, preparation of decommissioning plans, procurement of equipment and materials, research and development, spent fuel handling, and hot cell cleanup.
331XX	17	01	Total footprint area of facility	SF (M2)	<b>PRE-DECOMMISSIONING OPERATIONS</b> Pre-decommissioning operations during remedial action comprise development of the decommissioning plan, estimating dose and radioactivity levels, and licensing.
331XX	17	02	Total footprint area of facility	SF (M2)	<b>FACILITY SHUTDOWN ACTIVITIES</b> Facility shutdown activities are any activities during remedial action that are necessary for the closing of a nuclear or other facility. These include sampling,

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					defueling, plant decontamination, inspections, and building entombment. For waste disposal see "Disposal (Other than Commercial)" (331XX.18) and "Disposal (Commercial)" (331XX.19).
331XX	17	03	Total footprint area of facility	SF (M2)	<b>PROCUREMENT OF EQUIPMENT AND MATERIAL</b> Provides for all work during remedial action associated with the procurement of dismantling, radiation protection, health physics, security and maintenance equipment.
331XX	17	04	Total footprint area of facility	SF (M2)	<b>DISMANTLING ACTIVITIES</b> Dismantling activities during remedial action are any activities which are part of the systematic disassembly of a nuclear or other facility. These include decontamination and/or isolation of areas, drainage and removal of fuel pool and linings, and removal of primary and auxiliary systems, and biological shields.
331XX	17	05	Total footprint area of facility	SF (M2)	<b>RESEARCH AND DEVELOPMENT (R&amp;D) - DECONTAMINATION/RADIATION MEASUREMENT/ DISMANTLING PROCESSES/TOOLS AND EQUIPMENT</b> Research and development during remedial action includes data collection, development of new dismantling equipment and new technologies, R&D of robotic and manipulator technology, simulations, literature and status reviews.
331XX	17	06	Total footprint area of facility	SF (M2)	<b>SPENT FUEL HANDLING</b> Spent fuel (high level waste) handling during remedial action includes all work associated with temporary and intermediate fuel storage, reprocessing, transferring, conditioning. For waste disposal see "Disposal (Other than Commercial)" (331XX.18) and "Disposal (Commercial)" (331XX.19).
331XX	17	07	Total footprint area of facility	SF (M2)	<b>HOT CELL CLEANUP</b> Hot cell cleanup is the decontamination of hot cells during remedial action to allow a minimum of Level C manned entry prior to the startup of further research projects in the hot cell. These activities include inspection, radioactive surveys, dismantling, cell and equipment decontamination, maintenance and cleaning, and transport of materials and equipment. Decontamination techniques include CO <sub>2</sub> blasting, electropolishing, chemical immersion, vacuum blasting and scabbling.
331XX	17	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all remedial action decontamination and dismantling work not described by the above listed subsystems.
331XX	18				<b>DISPOSAL (OTHER THAN COMMERCIAL)</b> Includes operation (separate items for each subsystem disposal method) of the

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					plant facility during the remedial action phase, based on the volume of waste material disposed, including portable treatment equipment which is charged on a time basis and can be used on more than one project (331XX.18.(01.-10.)). Includes a separate item for the construction of a permanent disposal facility, including permanent disposal equipment, which is purchased for one disposal facility only (331XX.18.-15.). Disposal (Other than Commercial) provides for the final placement of HTRW or ordnance at facilities owned or controlled by the Government. An example would be the disposal of wastes through burial at a DOE nuclear facility or ordnance disposal at DOD facilities. Includes handling, disposal fees, and transportation to the final Destruction/Disposal/Storage facility. Excluded is the transportation to a facility for treatment prior to final disposal. For transportation prior to final disposal see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04). Disposal may be accomplished through the use of secure landfills, burial grounds, trench, pits, above ground vault, underground vault, underground mine/shaft, tanks, pads (tumulus / retrievable storage, other), storage buildings or protective cover structures, cribs, deep well injection, incinerator, or other.
331XX	18	01	Volume of waste material	CY (M3)	<b>LANDFILL / BURIAL GROUND / TRENCH / PITS</b> Provides for operation of a landfill, burial ground, burial trench, or burial pits during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see "Disposal Fees and Taxes" (331XX.18.-22).
331XX	18	02	Volume of waste material	CY (M3)	<b>ABOVE GROUND VAULT</b> Provides for operation of an above ground disposal vault during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see "Disposal Fees and Taxes" (331XX.18.-22).
331XX	18	03	Volume of waste material	CY (M3)	<b>UNDERGROUND VAULT</b> Provides for operation of an underground disposal vault during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see "Disposal Fees and Taxes" (331XX.18.-22).
331XX	18	04	Volume of waste material	CY (M3)	<b>UNDERGROUND MINE / SHAFT</b> Provides for operation of an underground disposal mine/shaft during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see "Disposal Fees and Taxes" (331XX.18.-22).
331XX	18	05	Volume of waste material	MGA (KLI)	<b>TANKS</b> Provides for operation of disposal storage tanks during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see "Disposal Fees and Taxes" (331XX.18.-22).

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	18	06	Volume of waste material	CY (M3)	<b>PADS (TUMULUS / RETRIEVEABLE STORAGE / OTHER)</b> Provides for operation of a disposal pads (tumulus, retrievable storage, or other) during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see 'Disposal Fees and Taxes' (331XX.18.22).
331XX	18	07	Volume of waste material	CY (M3)	<b>STORAGE BLDGS / PROTECT CVR STRUCT / OTHER BLDGS &amp; STRUCT</b> Provides for operation of disposal storage buildings, protective cover structures, or other disposal storage structures during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see 'Disposal Fees and Taxes' (331XX.18.22).
331XX	18	08	Volume of waste material	CY (M3)	<b>CRIBS</b> Provides for operation of disposal cribs during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see "Disposal Fees and Taxes" (331XX.18.22).
331XX	18	09	Volume of waste material	MGA (KLI)	<b>DEEP WELL INJECTION</b> Provides for operation of a deep well injection facility during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see 'Disposal Fees and Taxes' (331XX.18.22).
331XX	18	10	Volume of waste material	CY (M3)	<b>INCINERATOR</b> Provides for operation of an incinerator during the remedial action phase. For disposal taxes and fees charged between agencies or departments, see "Disposal Fees and Taxes" (331XX.18.22).
331XX	18	15	Each facility	EA (EA)	<b>CONSTRUCTION OF PERMANENT DISPOSAL FACILITY</b> New remedial action construction of a permanent disposal facility to dispose of wastes through any of the disposal methods listed above (331XX.18). Add a note for this item to explain which of the above subsystem disposal methods are used in the plant.
331XX	18	20	Number of waste containers	EA (EA)	<b>CONTAINER HANDLING</b> Provides for all work during remedial action associated with the handling of waste containers for periodic inventory or inspection. Does not include placement of waste into disposal units.
331XX	18	21	Weight of waste material	TON (MT)	<b>TRANSPORTATION TO STORAGE/DISPOSAL FACILITY</b> Transport to storage/disposal facility during remedial action includes equipment, materials, and labor for hauling, loading and unloading of solid waste and liquid wastes.
331XX	18	22	Weight of waste material	TON (MT)	<b>DISPOSAL FEES AND TAXES</b>

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					Provides for all fees and taxes charged during remedial action for the disposal of wastes. These include fees and taxes charged between agencies, departments and activities at government facilities.
331XX	18	23	Weight of waste material	TON (MT)	<b>MIXED WASTE STORAGE FEES AND TAXES</b> Provides for all fees and taxes charged during remedial action for the storage of mixed wastes at government facilities.
331XX	18	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all disposal (other than commercial) during remedial action not described by the above listed subsystems.
331XX	19				<b>DISPOSAL (COMMERCIAL)</b> Commercial disposal during remedial action provides for the final placement of HTRW at third party commercial facilities that charge a fee to accept waste depending on a variety of waste acceptance criteria. Fees are assessed based on different waste categories, methods of handling, and characterization. Disposal may be accomplished through the use of secure landfills, burial grounds, trench, pits, above ground vault, underground vault, underground mine/shaft, tanks, pads (tumulus / retrievable storage, other), storage buildings or protective cover structures, cribs, deep well injection, incinerator, or other. Includes transportation to the final Destruction/Disposal/Storage facility. Excludes transportation to a facility for treatment prior to final disposal. For transportation see "Transport to Treatment Plant" (331XX.05.11, 331XX.06.08, 331XX.08.03 or 331XX.09.04).
331XX	19	20	Number of waste containers	EA (EA)	<b>CONTAINER HANDLING</b> Provides for all work during remedial action associated with the handling of waste containers for periodic inventory or inspection. Does not include placement of waste into disposal units.
331XX	19	21	Weight of waste material	TON (MT)	<b>TRANSPORTATION TO STORAGE/DISPOSAL FACILITY</b> Transport to storage/disposal facility during remedial action includes equipment, materials, and labor for hauling, loading and unloading of solid and liquid wastes.
331XX	19	22	Weight of waste material	TON (MT)	<b>DISPOSAL FEES AND TAXES</b> Provides for all fees and taxes charged during remedial action for the disposal of wastes. These include fees and taxes charged at third party/commercial facilities.
331XX	19	23	Weight of waste material	TON (MT)	<b>MIXED WASTE STORAGE FEES AND TAXES</b> Provides for all fees and taxes charged during remedial action for the storage of mixed wastes at third party/commercial facilities.

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	19	9x			<b>OTHER (Use Numbers 90-99)</b> Includes all commercial disposal during remedial action not described by the above listed subsystems.
331XX	20				<b>SITE RESTORATION</b> Site restoration during remedial action includes topsoil, seeding, landscaping, restoration of roads and parking, and other hardscaping disturbed during site remediation. Note that all vegetation and planting is to be included as well as the installation of any site improvement damaged or altered during construction. All vegetation and planting for the purpose of erosion control during construction activities should be placed under "Erosion Control" (331XX.05.13). Treated soil used as backfill will be placed under "Disposal (Other than Commercial)" (331XX.18). All new site improvements, those not disturbed during construction, are to be included under "Sitetwork" (331XX.03).
331XX	20	01	Volume of material	CY (M3)	<b>EARTHWORK</b> Includes stripping topsoil, excavation, backfill, compaction, fine grading, hauling spoil, importation of borrow material and topsoil during remedial action.
331XX	20	02	Number of markers	EA (EA)	<b>PERMANENT MARKERS</b> Provides for the establishment of permanent markers during remedial action.
331XX	20	03	Number of features	EA (EA)	<b>PERMANENT FEATURES</b> Provides for the re-establishment during remedial action of pre-existing roads, bridges, buildings, structures and utilities which were in place prior to construction. For temporary relocation of roads/structures/utilities, see "Temporary Relocations" (331XX.01.06).
331XX	20	04	Total area	ACR (HEC)	<b>REVEGETATION AND PLANTING</b> Revegetation and planting provides for the complete restoration of areas affected by remedial action construction. This includes fine grading and leveling of topsoil, seeding, mulching, fertilizing, sodding, erosion control, shrubs, and trees.
331XX	20	05	Number of barriers	EA (EA)	<b>REMOVAL OF BARRIERS</b> Provides for the removal of all temporary barriers and fencing erected during remedial action construction.
331XX	20	9x			<b>OTHER (Use Numbers 90-99)</b> Includes all site remedial action restoration activities not described in the above listed subsystems.

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	21				<b>DEMOLITION</b> Provides for all work associated with remedial action plant takedown and removal of temporary facilities, utilities, equipment, material, and personnel.
331XX	21	01	Each facility	EA (EA)	<b>REMOVAL OF TEMPORARY FACILITIES</b> Removal during remedial action of temporary facilities includes demolition and dismantling of office trailers, storage and decontamination facilities, and other temporary facilities.
331XX	21	02	Each utility	EA (EA)	<b>REMOVAL OF TEMPORARY UTILITIES</b> Provides for the dismantling and disconnection of project utilities during remedial action including site power and lighting, telephone/communication service, water, sewer and gas service.
331XX	21	03	Each project	EA (EA)	<b>FINAL DECONTAMINATION</b> Final decontamination provides for all work associated with the cleaning and decontamination of equipment and other facilities used for remedial action.
331XX	21	04	Each item mobilized	EA (EA)	<b>DEMOLITION OF CONSTRUCTION EQUIPMENT AND FACILITIES</b> Work associated with demolition of remedial action construction equipment and temporary facilities. Includes transportation, manifests, tolls, permits, escort vehicles, drivers, and equipment operators. Also see " Construction Plant Takedown" (331XX.21.07).
331XX	21	05	Number of personnel	EA (EA)	<b>DEMOLITION OF PERSONNEL</b> Demobilization of remedial action personnel includes relocation of supervisory personnel and workmen after project completion.
331XX	21	06	Each submittal	EA (EA)	<b>SUBMITTALS</b> Submittals are incurred for obtaining all necessary site clean closure documentation. These include all final reports, punch lists, project acceptance, final QA/QC reports and As-Built Drawings during remedial action .
331XX	21	07	Each plant	EA (EA)	<b>CONSTRUCTION PLANT TAKEDOWN</b> Construction plant takedown includes dismantling of batch plants, cleaning, disposal of debris, and transport of plant equipment during remedial action.
331XX	21	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all remedial action demolition work not described in the above listed subsystems.
331XX	22				<b>GENERAL REQUIREMENTS</b> General remedial action requirements which are not specifically identifiable in the other systems such as indirect, overhead, profit, and other general

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
					requirements. This system is OPTIONAL. It may be used to separately show general requirements; however, if it is not used, general requirements must be distributed throughout in the other systems.
331XX	22	01	Duration on site	MO (MO)	<b>SUPERVISION AND MANAGEMENT</b> Personnel, vehicles, and per diem required for field supervision and management of remedial action work. Also includes personnel at the home office not captured under home office G&A (331XX.22.12.).
331XX	22	02	Duration on site	MO (MO)	<b>ADMINISTRATION JOB OFFICE</b> Personnel, vehicles, travel and per diem, and administrative supplies required for field administration of remedial action work. Also includes personnel at the home office not captured under home office G&A (331XX.22.12.).
331XX	22	03	Duration on site	MO (MO)	<b>WAREHOUSE, MATERIALS HANDLING, AND PURCHASING</b> Personnel, vehicles, travel and per diem, supplies and equipment required for field warehouse, materials handling, and purchasing for remedial action work.
331XX	22	04	Duration on site	MO (MO)	<b>ENGINEERING, SURVEYING AND QUALITY CONTROL</b> Personnel, vehicles, travel and per diem, supplies, equipment, and engineering services required for field engineering, surveying, and quality control/assurance for remedial action work. Also includes personnel at the home office not captured under home office G&A (331XX.22.12.).
331XX	22	05	Duration on site	MO (MO)	<b>EQUIPMENT MAINTENANCE AND MOTOR POOL</b> Personnel, vehicles, travel and per diem, equipment, and related items required for field construction equipment maintenance and motor pool for remedial action work.
331XX	22	06	Duration on site	MO (MO)	<b>FIRST AID, FIRE PROTECTION, TRAFFIC CONTROL AND SECURITY</b> Personnel, vehicles, travel and per diem, equipment, and related items for field first aid, fire protection, traffic control and security for remedial action work.
331XX	22	07	Duration on site	MO (MO)	<b>HEALTH AND SAFETY</b> Personnel, vehicles, travel and per diem, protective equipment, personnel protective equipment and clothing, monitoring, training, exams, and related items required for field health and safety for remedial action work.
331XX	22	08	Duration on site	MO (MO)	<b>TEMPORARY CONSTRUCTION FACILITIES - OWNERSHIP</b> Ownership or rental for field office trailers, facilities, and related items for temporary construction facilities for remedial action work. Excluded are initial setup or construction of the temporary facilities, which is included in "Mobilization and Preparatory Work" (331XX.01.), and final takedown or removal of the temporary facilities, which is included in "Demobilization"

## HTRW REMEDIAL ACTION WORK BREAKDOWN STRUCTURE

ACCOUNT (LEVEL 1)	SYSTEM (LEVEL 2)	SUBSYSTEM (LEVEL 3)	DESCRIPTION OF MEASUREMENT	UOM ENG(MET)	STANDARD DESCRIPTION
331XX	22	09	Duration on site	MO (MO)	<b>TEMPORARY CONSTRUCTION FACILITIES - OPERATION</b> Personnel, vehicles, travel and per diem, supplies, services, and related items for the operation of temporary construction facilities during remedial action work.
331XX	22	10	Duration on site	MO (MO)	<b>PROJECT UTILITIES</b> Usage of temporary project utilities during remedial action work. Excluded is the construction of the temporary project utilities, which is included in "Mobilization and Preparatory Work" (331XX 01.), and the removal of the temporary project utilities, which is included in "Demobilization" (331XX 21.).
331XX	22	11	Duration on site	MO (MO)	<b>MISCELLANEOUS PROJECT EXPENSES</b> Programs (such as startup programs and craft qualification programs), photographs, videos, air freight, submittals and permits following preparatory work, signs, winterization, inventory, property protection, vehicles, travel and per diem, and other miscellaneous project expenses during remedial action work.
331XX	22	12	Duration on site	MO (MO)	<b>INSURANCE, INTEREST, AND FEES</b> Insurance, interest, home office overhead, profit, and bond for remedial action work.
331XX	22	9X			<b>OTHER (Use Numbers 90-99)</b> Includes all general requirements during remedial action demobilization work not described in the above listed subsystems.